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Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

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"MULING" POLES

Mule was drafted to assist in "snaking" poles into location in mountainous terrain by Sunland-Tujunga Telephone Co. of Sunland, Cal.; 14,450 feet of cable were placed over a mountain range. See page 37 for further details.

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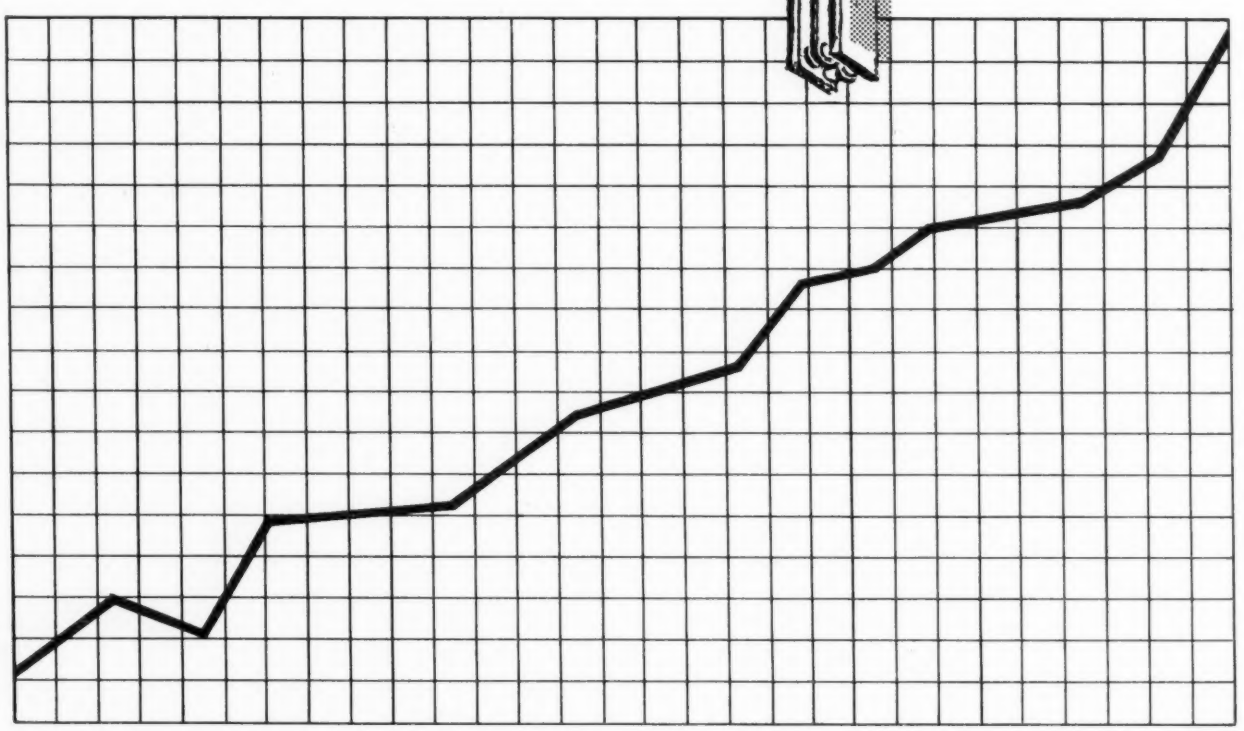
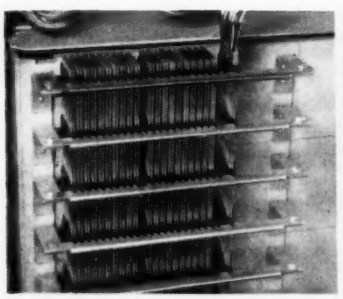
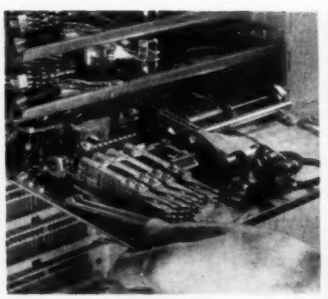
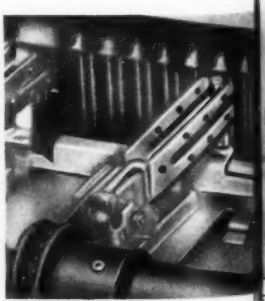




Vertical multiple wire bank units of nickel silver wire are part of every XY Dial System. They stay dust-free.



Famous XY Universal Switch slips into position as a finder, selector or connector in seconds, without alterations.



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This money-saving feature is only one of many profitable advantages you enjoy with XY® dial equipment. For example:

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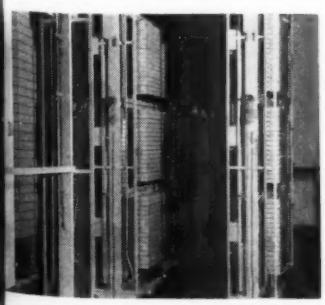

Equipment racks are mounted back to back to save costly floor space in building or expanding exchange. Servicing and expansion of system are easy and inexpensive.

FLASHES AND PLUGS

POINT OF VIEW. In the heat of battle, it's good to know where one may turn for authoritative information. One such oracle which claimed to have the inside story on developments confusing to others was the Egyptian public information office which announced on Nov. 18 that it was opening a bureau "to correct all lies broadcast and spread by the enemy."

A notice in the newspaper *Al Mesaa* told readers to telephone number 56967 and get "the truth about all lies immediately."

•

BREVITY PAID. *Illinois Bell Telephone News* in November delved back 54 years and brought to light information which should make telephone users today appreciate how lucky they are. The *News* said:

Seconds on a long distance call really counted back in 1902. Charges were made for an initial period of 15 seconds. Additional charges were even more finely drawn. In some cases it cost five cents for each additional two seconds. The more usual periods of time for additional charges varied from 10 to 30 seconds, each at five cents per period.

According to a telephone directory issued by the old Pacific States Telephone & Telegraph Company, serving Portland, Ore., "talk" over a pair of wires was an expensive commodity. Even the example used in the directory to show the customer how much could be said in 15 seconds was "tight" talk. Check the wording:

"I did not telegraph, fearing you were out of town. Could not spare the time to go up on the train. Must have your decision now, so called you by telephone."

To more distant points, cost climbed rapidly—unless the subscriber rattled off his message and breathlessly hung up. A Portland to San Francisco call, for instance, was featured as a special. The rate: 75 cents for ¼ minute.

Long distance calling today is cheap any way you look at it. An evening call can be made from Chicago to any point in the United States for less than $2.00 for three minutes—plus tax, of course. (No tax in 1902!) When the transcontinental service was first opened in 1915 a call across the nation cost $20—a week's pay for most people in those days.

•

LEISURE ALOFT. Shortly before 3 p.m. recently, one of a dozen painters employed at the Manhattan end of the Williamsburg Bridge in New York City, took a moment to stretch out on his scaffold and relax, 200 ft. above street level. But he didn't look relaxed to a woman on the Lower East Side, who telephoned police that some one was getting ready to jump from the bridge.

Radio cars, an emergency squad and foot patrolmen rushed to the scene. With all this happening, the foreman of the paint crew, upon counting noses, reported his gang intact.

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Since 1901

December 8, 1956

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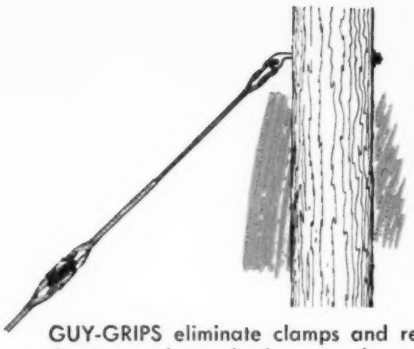

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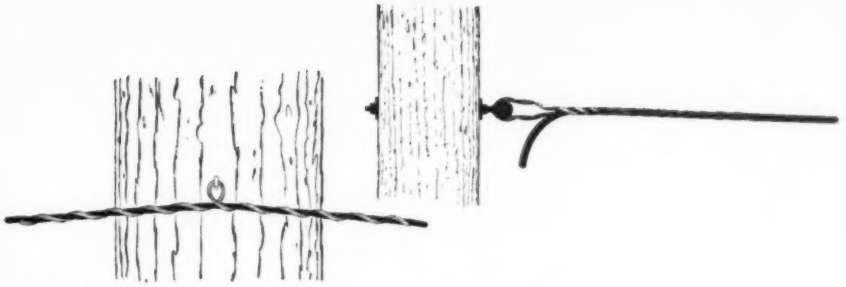

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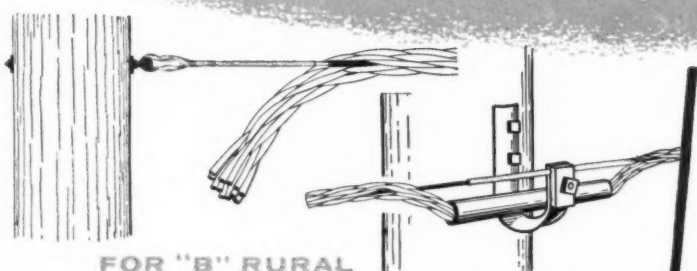

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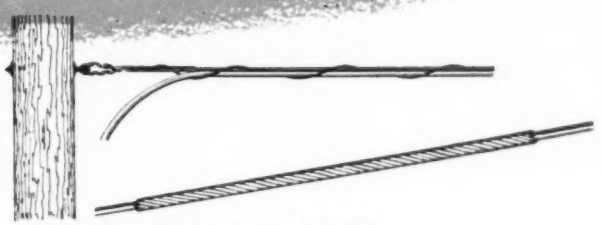

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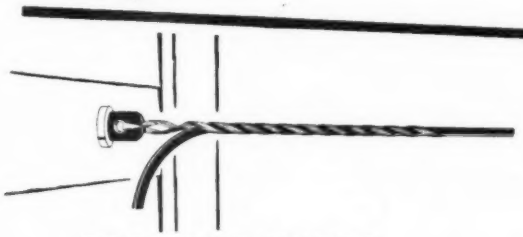

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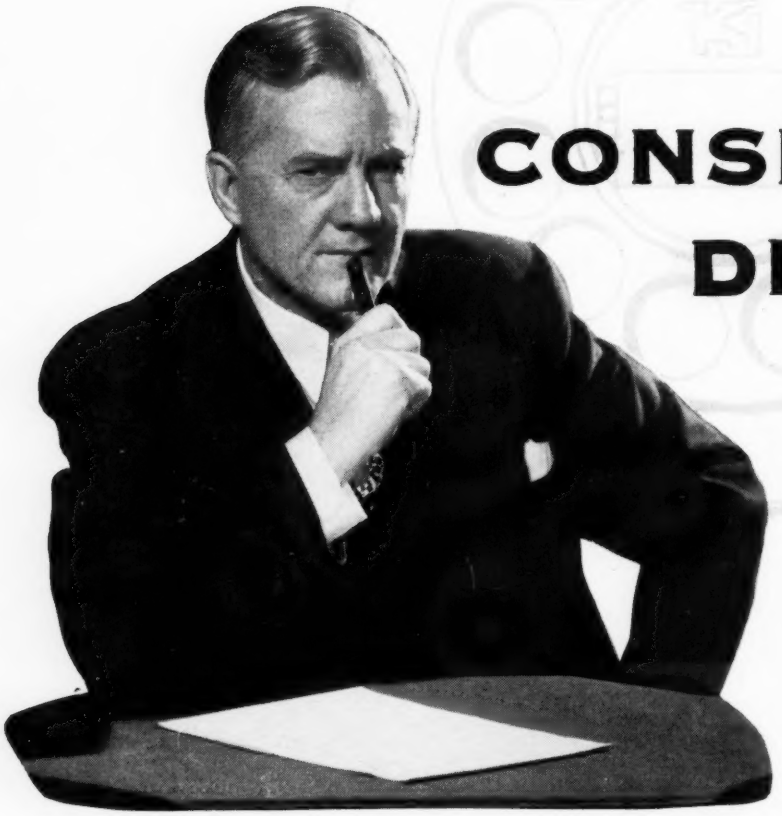

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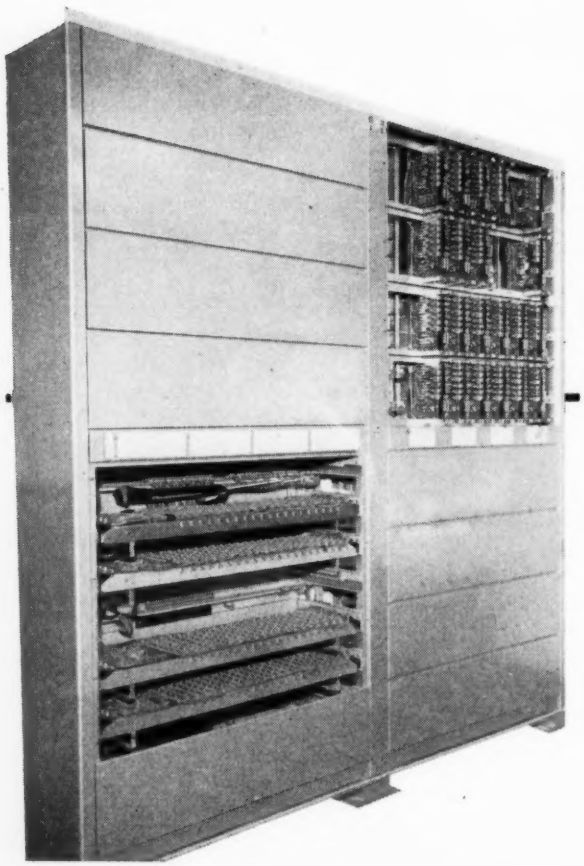

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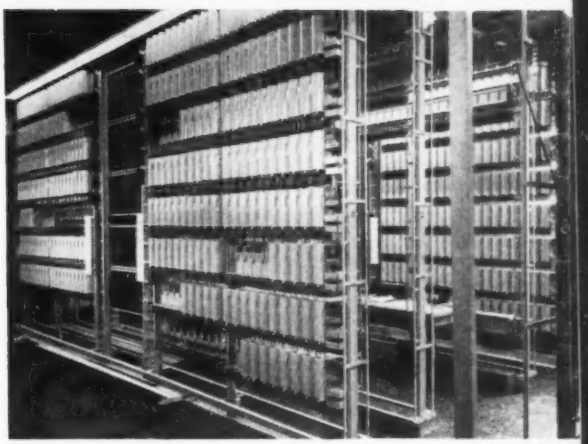

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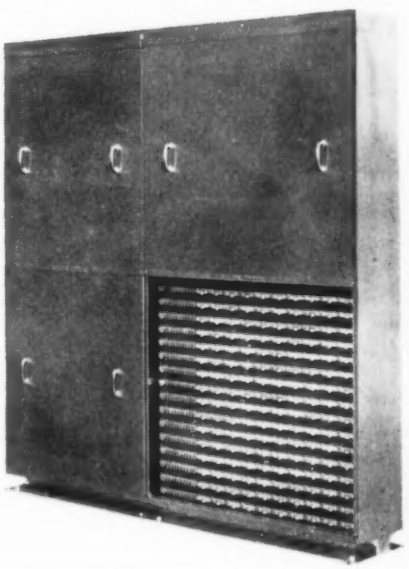

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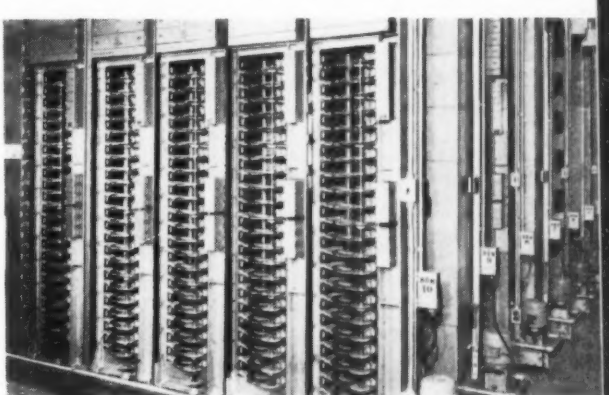

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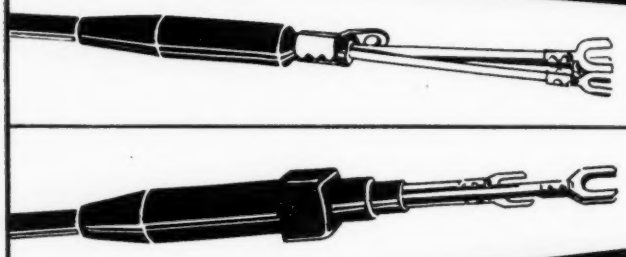

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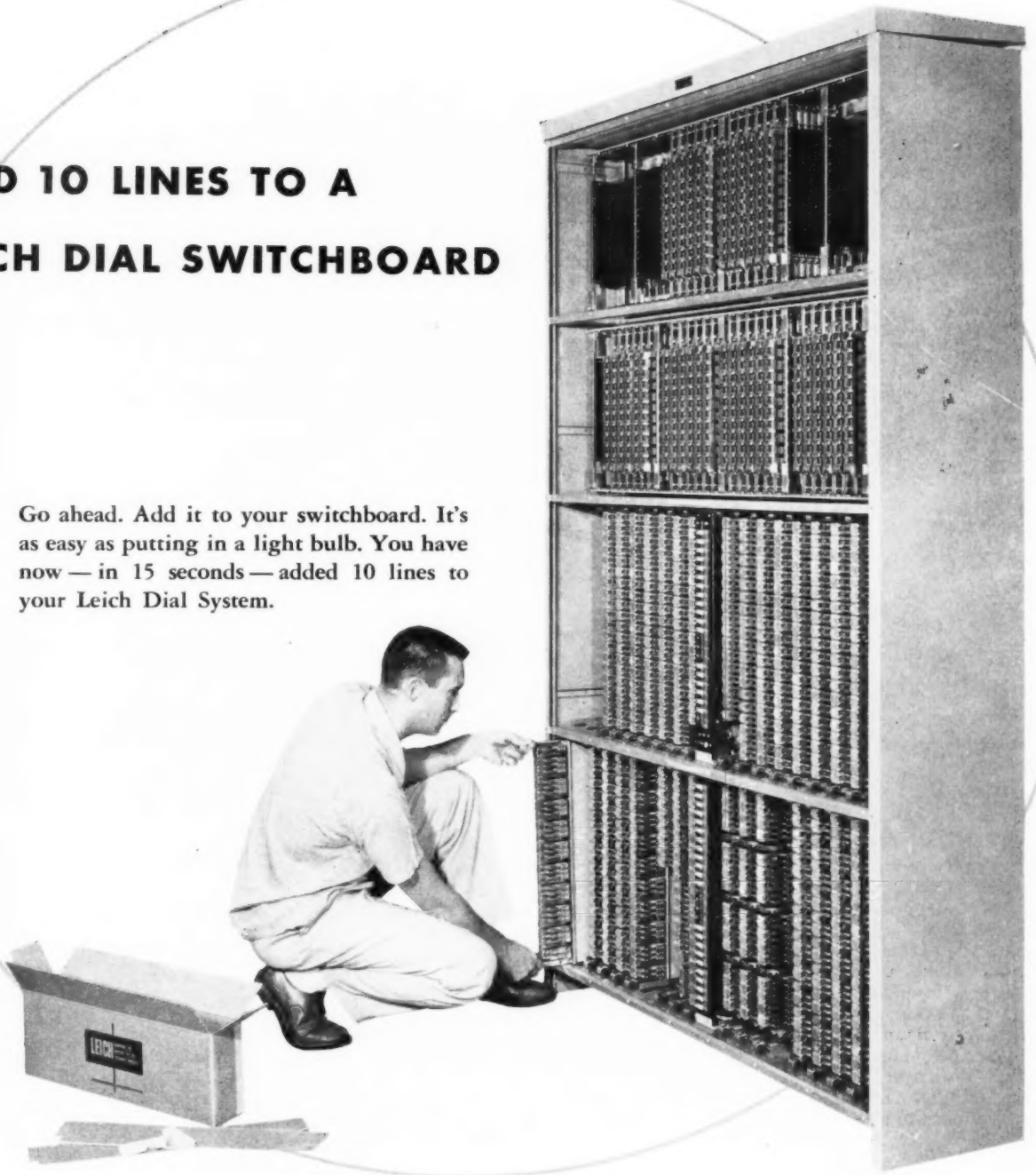

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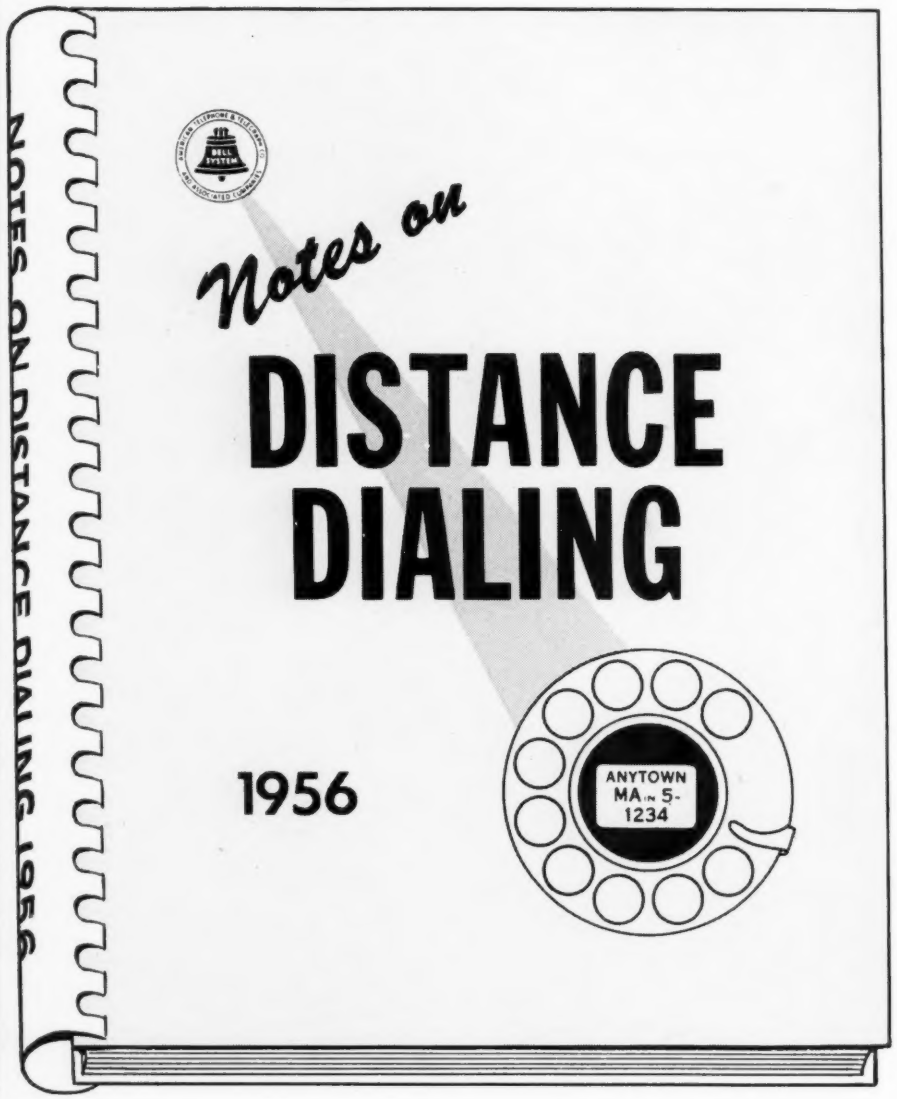
The revised "Notes on Distance Dialing"



New procedures and changes in certain technical requirements meant that some parts of the 1955 "Notes on Nationwide Dialing" needed to be brought up to date. This has been done and the revised 1956 edition, "Notes on Distance Dialing," is now available.

Here are a few of the items of particular interest in the revised "Notes":

1. Elimination of the National Center concept;
2. Change in requirements from "full" intercept to "adequate" intercept, including a definition of "adequate" intercept;
3. Change in requirements for supervision on trunks to distant point information;
4. Establishment of single-channel operation as a Bell System long range objective.

The revised "Notes" are another splendid example of the fruitful co-operation between the Bell System, Independent operators, manufacturers and engineering consultants.

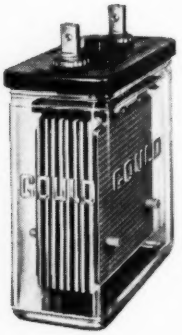
Persons having the original "Notes," and others who may find them useful, should contact their nearest Bell System Associated Company to obtain the new, 1956 edition.

BELL TELEPHONE SYSTEM

XUM

The United States Independent Telephone Association's Dial Interexchange Technical Subcommittee and Bell System Representatives are shown at one of the frequent meetings held to discuss proposed changes in the "Notes on Distance Dialing." Left to right around the table: John H. Meyer, J. W. Gorgas, L. B. Bogan, M. L. Donaldson, D. W. Haskins, Harry Disston, C. M. Davis, J. P. Ringland and L. L. Ruggles.

LEAP ooo but not before you look at Gould's "extra-value" features:



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XUM

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Latest request of New York Telephone Co. (Bell) for rate increase means a showdown on basing rates on replacement cost vs. original cost. House committee hears testimony on excise taxes. NLRB issues unfair labor practice complaint against union in Ohio strike.

THE NEW YORK Telephone Co.'s latest request for a 54.4 million dollar rate increase is going to be far more than a routine rate case of interest only in New York State. It is going to mean a showdown before the New York Public Service Commission to determine (1) whether the commission is willing to follow the mandate of its own highest court in fixing telephone rates on a replacement cost base, as provided by the state regulatory law; (2) whether the governor of New York will attempt to interfere with the regulatory process, by asking the legislature to spell out an ironbound formula which will include his own preferences for imposing rate-making standards on the commission; (3) whether the legislature will go along with the governor or decide that some measure of regulatory discretion ought to be preserved for the commission under the law as it now stands.

Late last month the New York Telephone Co. put the issue squarely before the New York commission by seeking the 54.4 million dollar rate increase, which would, if granted, carry out the objective of the company's original rate increase application of $68,850,000 filed in 1953. That application was based on the replacement cost approach. It was subsequently upheld by the New York Court of Appeals interpreting the New York regulatory statute as it applies to telephone companies (1956) 12 PUR3d 399.

During this litigation, the commission allowed the company to put into effect two "stop-gap" increases, totaling $23,745,000, in which the commission's preference for original cost rate making was not contested. Now, however, the company is asking the commission to carry out the mandate of the court by allowing the larger rate increase, based on a replacement cost approach.

There is little doubt that Governor Harriman will not even await the outcome of the case before the commission. The governor has already threatened retaliation in the form of legislative amendment to be introduced early next month. He was unsuccessful in such an effort early this year when the New York Legislature adjourned without final action on the governor's bill which would have required the commission to confine its telephone rate-making to original cost. The governor's statement implies that a similar bill will be pushed in the session of the legislature which meets on Jan. 9, 1957.

A telephone company spokesman, explaining the delay in requesting the reopening of the original rate case before the commission, said that a resurvey has to be made to revaluate the company's properties in the light of the court's decision. The increases sought would average about 6½ per cent of revenues. The company's president, Keith S. McHugh, said that to insist upon an original cost base was "like saying to a home owner that a house he bought for $7,500 in 1940 is worth not a penny more in today's market."

If Governor Harriman goes ahead with his program, he will be challenging an important precedent in public utility regulation—one which has been ratified and confirmed by the U. S. Supreme Court, in principal at least, in various cases. That is the regulatory theory that *public service commissions ought to be independent.* The commissions were set up in the first place because the old attempts at direct legislative rate-making, during the latter part of the 19th century, were too clumsy and inefficient to do a decent job in a very complicated field. Since they were established in the early part of this century, the state commissions have grown in experience and stature until they now command the respect of the courts generally. A growing body of court-made law, culminating with the Hope Natural Gas decision in 1944, indulges in presumptions favorable to the so-called "expertise" (to use the term of U. S. Supreme Court Justice Frankfurter) of the state and federal regulatory commissions.

When a governor asks his legislature to change the rate case rules (by statute) so as to order the public service commissioners around like hired hands, assigned to follow strict orders from either him or the legislature, he seeks to turn the clock back. If he is successful, it may well be a setback from which public service commission regulation, in New York State at least, will not soon recover.

The Excise Tax Hearings

Last week the annual hearings before the House Ways and Means subcommittee on excise taxes took place. The purpose of these hearings is to listen to testimony from various witnesses representing industries whose products or services are now taxed. This includes, of course, the 10 per cent excise tax on all forms of communications by land, sea, air, whether by physical carriage or the carrying of intelligence.

In other words, the federal government is still collecting the 10 per cent on plane, train, bus, and steamship passenger fares. It is also, as the readers of this department well know, collecting a 10 per cent excise on monthly bills, long distance calls, telegrams, radiograms, etc. A Bell System spokesman on Nov. 30 pleaded with

the House sub-committee to repeal this 10 per cent tax on telephone service.

These annual hearings of the House sub-committee, however, are becoming a sort of ritual. Industries, whose products or services are taxed, send witnesses to urge the reduction or elimination of such taxes. Yet, there is the suspicion that they do so with little hope that Congress is going to make an exception in their particular favor, and wipe out such excise taxes for their products or services alone.

But on the theory that it is the squeaky axle that gets the grease, a failure to speak up might give rise to a temptation on the part of Congress to plaster a particular industry with *more* taxes. And so we have the annual merry-go-round of cosmetic manufacturers, liquor and night club spokesmen, leather and jewelry, phonographs, radio and television set manufacturers—all asking Congress to cut down or cut out the present rate of excise tax collections as they affect them.

The prospect is, however, that the next session of Congress is not likely to do very much about these excise tax collections. To do something for one without doing something for all would be to invite a real outburst from the indignant industries which failed to get the favored treatment.

In addition, there is the troubled foreign situation, the threat of inflation, and the cynical fact that 1957 is not an election year. And, so, on the premise that Uncle Sam still needs the money from these excises, this correspondent does not look for any substantial change.

One exception might possibly be made in the case of television sets (taxed at 10 per cent) which can receive ultrahigh frequency broadcast as well as very high frequency broadcasts. The idea here is to encourage the manufacturers as well as the public to favor increased use of the higher frequencies. But even the promotion of such a worthwhile project, by mere tax discount, would seem doubtful.

The disturbing long-range possibility, in this whole situation, is that the excise tax collections, as presently applied, will be harder to remove the longer they remain in effect. With every year they are crystallizing into such an accepted component of our tax structure that resistance to them becomes less and less. Politicians are quick to sense this and take advantage of the same. And, so, these taxes, which started for the most part as "temporary" or "emergency" or "wartime," are gradually assuming the character of a permanent levy for the benefit of the U. S. Treasury.

NLRB Tackles Ohio Strike

The National Labor Relations Board on Nov. 27 issued an unfair labor practices complaint against the Communications Workers of America in the long strike against the Ohio Consolidated Telephone Co. It ordered a hearing on the complaint to be held at Portsmouth, O. The strike, which started last July 15, has affected Ohio Consolidated exchanges in 24 southern and southeastern Ohio counties. The Portsmouth area has been without telephone service since Oct. 15 as a result of violence in the strike. The complaint grouped cases against the CWA and its Local 4372.

The NLRB, in issuing its complaint, directed that a hearing on it be held at Portsmouth on Dec. 11. The union had denied responsibility for acts of violence in the strike, but most of the 26 points included in the NLRB complaint said the union and its "agents or representatives" used violence or threats against the company and its supervisory and managerial employes. Many of the union's "agents or representatives" were listed by name.

Meanwhile, the Republican-controlled Ohio legislature on Nov. 28, adminis-

(Please turn to page 42)

REA Makes Telephone Loans in Three States

The Rural Electrification Administration made loans for improving and expanding telephone service in rural areas of Montana, Tennessee and Texas, during Nov. 19-23, the U. S. Department of Agriculture announced on Nov. 27. The three loans amounted to $760,000. Details follow:

Blackfoot Telephone Cooperative Association, Missoula, Mont., $48,000, second loan (Nov. 19).

The borrower will use these funds together with the first loan of $488,000 to provide new and improved service to 645 rural subscribers. The system will consist of 411 miles of line, and automatic offices at Arlee, Clinton, Elliston and Ovando. Nick E. Ginoff is president and Jay W. Preston is manager of the Blackfoot Telephone Cooperative Association.

*

Loretto (Tenn.) Telephone Co.; $550,000, first loan (Nov. 23).

The borrower is a commercial corporation which will use the loan to bring telephone service for the first time to 881 farm families. The dial service which the company plans will improve service to 343 existing subscribers.

The Loretto company plans to construct automatic central offices at Leona and Loretto. The present Loretto building will be remodeled and used for commercial office facilities, and the St. Joseph exchange eliminated.

Ralph J. Passarella is president and manager of the Loretto Telephone Company.

*

Clifton (Tex.) Telephone Co.; $157,000, second loan (Nov. 23).

The borrower will use these funds to furnish new service to 100 additional rural subscribers. As a nucleus, the company proposes to acquire, without charge, access rights to the area served by the Turnersville (Tex.) Telephone Club. At present this mutual organization is providing magneto service to 45 subscribers.

The Clifton company plans to build an automatic central office building at Turnersville. The borrower will offer service for the first time to 55 farm families now without telephones, and improve service for present subscribers.

In addition, a portion, of the loan will be used to complete the automatic central office and commercial building in Clifton, already under construction.

REA loans to the Clifton company total $465,000, which will make possible new and improved service to 960 subscribers over 300 miles of line and automatic exchanges at Clifton, Laguna Park and Turnersville.

J. W. Blewett Sr. is president and manager of the Clifton Telephone Company.

XUM

The Case for the Vacuum Tube Tester

By HAROLD B. McKAY, Electronics Editor

THE USE of a tube tester has been a controversial matter among radio men. Even manufacturers and large users may feel that the best test of any tube is whether or not it will work in the circuit one is concerned with at the moment. Thus, a telephone man is concerned with how a tube performs in a carrier circuit, not in some other circuit.

A tube may be tested for various reasons. Among these are tests to determine the remaining life in a tube. A telephone company might test all of its working tubes on a routine basis for this reason. A repairman checking a circuit failure might want to first test the tubes. This is logical because tubes wear out, and they are usually suspected first when any electronic equipment gets out of order.

Radio and TV repairmen frequently test tubes for this latter reason. But tubes in working circuits may be subjected to a wide variety of voltages and operating conditions which are not duplicated by the tube tester. Therefore, the tube tester cannot be considered as having the final judgment as to whether a tube is good or bad.

It is a safe bet that some of the tubes in your radio or TV set, if placed in a tube tester right now, would show to be of questionable value, yet your set may be working perfectly. To determine the value of testing tubes, we must first consider some of the characteristics of vacuum tubes and how they might be measured.

The operation of a tube may be considered under either static or dynamic conditions. The static condition is when the tube has all dc connections made to it, but no signal is being sent through it. In other words, it is all hooked up, but doing nothing but use power.

The dynamic condition is when an ac signal is being applied to the input and the tube is actually working, amplifying the signal.

A number of troubles can occur in a tube. Elements can become shorted to one another. The normally small amount of residual gas present in the envelope can increase under overload conditions. The filament electron emission can fall off as the active material is consumed.

Any system for testing tubes should take into account these possible troubles. A device which will connect a small lamp into each lead to the tube will show up short circuits between the elements. This is usually included as a standard feature on tube testers.

Compromise Test

Each feature of a tube could be tested by building a special circuit which would exercise the particular feature. However, for practical reasons it is usually better to settle upon one test which will be most indicative of the tube's over-all performance. A simple test is one that measures the emission of the tube. It consists of applying the correct heater voltage, then connecting all other elements (grids, plate) together. These combined electrodes are then connected to a dc plate supply through an ammeter.

In using such a circuit, an average would be established by measuring several tubes of a type. Any tube which fell much below the average would then be suspected. The emission test is sometimes employed by telephone companies for routine tests, as will be described later.

A more comprehensive test can be made by measuring the transconductance of a tube. The transconductance of a tube is a measurement which takes into consideration the amplification factor and the plate resistance of the tube. It is sometimes regarded as an over-all figure of merit because it relates to the actual operation of the tube. It is the ratio of a plate current change to the grid voltage change which produced it.

Because conductance is the reciprocal of resistance, this value is measured in "mhos" instead of ohms. Most tubes by this formula would have a value of a fraction of a mho, therefore, "micromhos" are used to give a whole number. Thus a tube which had a plate current change of one milliampere for a grid swing of one-half volt would have:

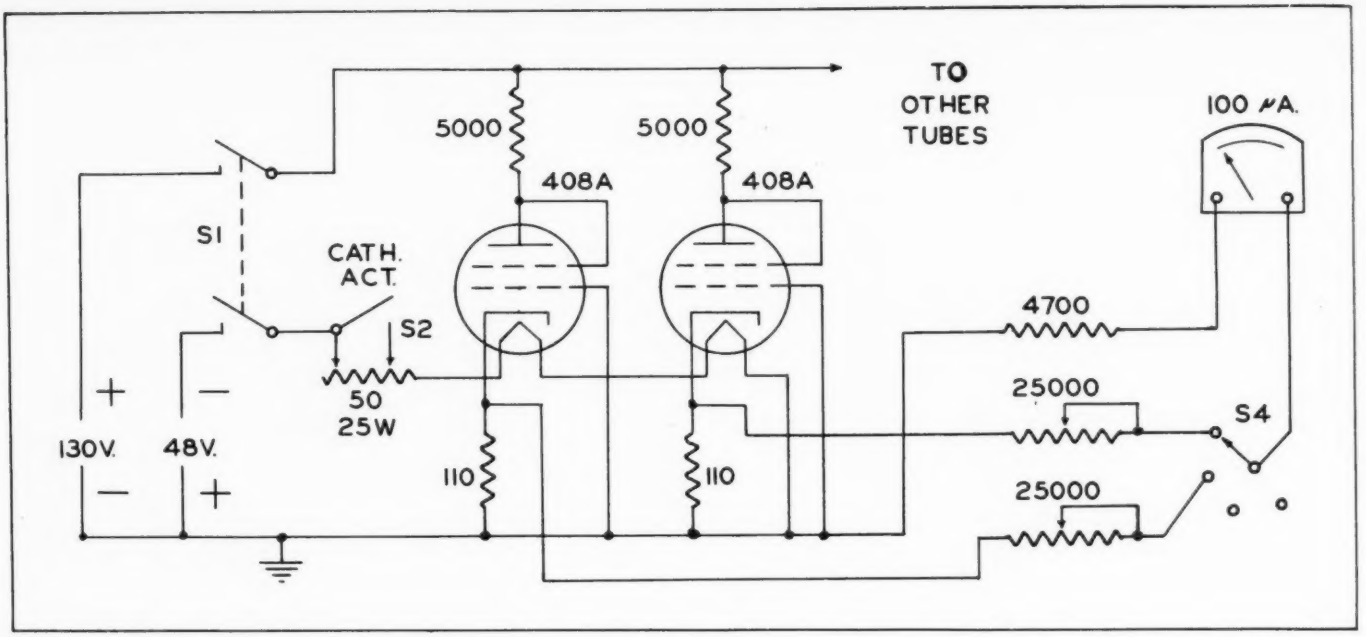
.001 amp/ .5 volt = .002 mho

This would be 2,000 micromhos. The plate resistance of a tube is the resistance of the electron stream between the cathode and plate. It can be measured by observing the results when the plate voltage is changed. The transconductance on the other hand depends upon the results obtained by a change in grid voltage.

Static Test

A transconductance test, then, may be regarded as better than a simple emission test. In simple form, a tester for this function would provide standard voltages, but with a provision for shifting the grid voltage from one value to another. By observing the results on the plate current and by applying the above formula, the transconductance could be determined.

However, this would still be a static test—it would be merely testing the tube under two different static conditions. A better method is the dynamic conductance test. This is the method



This is the circuit for an improvised tube tester that can make a cathode activity and emission test on several tubes at once. It is useful where many tubes must be tested on a routine basis. The values of the resistors are in ohms, and are correct for the tube type shown. For other tubes, values can be copied off of a circuit diagram or found by experiment. (Drawing by Victor Willard)

used in quality tube testers today. The circuit contains provisions for placing an alternating voltage on the grid of the tube, then measuring the alternating component of the plate current. This method has the advantage that it tests the tube under working conditions.

It must be remembered that tubes in actual circuits may be operating under quite different conditions than those imposed by a tube tester. The input of a tube has both resistive and reactive components which are dependent upon inter-electrode capacitances, internal lead length, gas molecules and electron transit time effects.

The results of these characteristics depend upon the frequency at which the tube is working, and a tube that will work at one frequency may not work at another.

In addition, the operating point on the plate curve is determined by the external circuit parameters and the performance of even "good" tubes may vary considerably.

Gassy Tubes

If gas is present in a tube, it will cause the grid to draw some current. This can cause a voltage drop in the external grid circuit which will alter the bias on the tube. This, in turn, can cause the circuit to fail.

This same fact can be used in a tube tester to detect the presence of gas. A good tube tester will have a circuit to detect the presence of grid current under a condition where none should flow, and register this fact as a gassy tube.

Telephone companies have found that a combination of tube testing methods suits their purposes. For routine testing of working tubes, an emission test is satisfactory, because this type of test tells when a tube is near the end of its useful life. Such tubes can be changed and discarded before they fail.

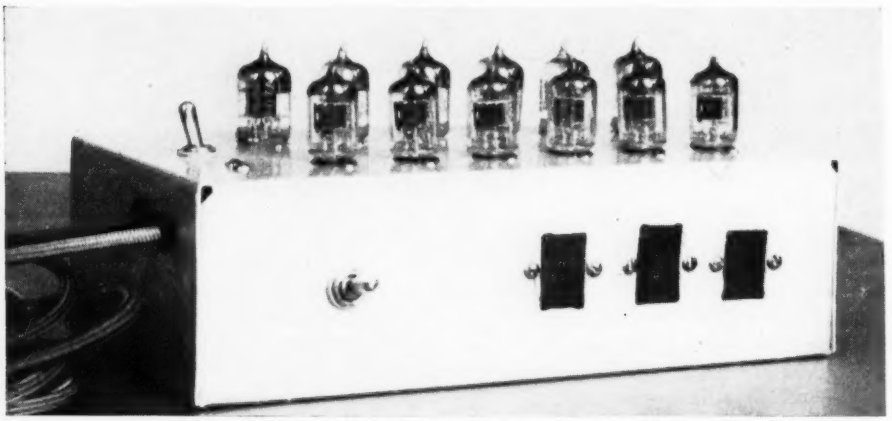
A tube tester made especially for telephone company use has a switch designated "Cathode Activity". When this switch is operated, the voltage applied to the heater is reduced by 10 per cent. This causes the meter reading to drop also. The amount that the meter declines can be interpreted as an indication of the amount of active material remaining on the cathode of the tube, and hence is an indication of the remaining life of the tube.

Some companies have prepared local test sets which will test several tubes at once for this feature. A circuit diagram for one such set is shown in the accompanying drawing. This set was made to test a number of 407A and 408A tubes in a carrier installation.

In use, a dozen tubes are removed from the carrier and placed in the test set. A rotary switch, S4, connects the meter to each tube as it is turned. The 25,000 potentiometers are adjusted separately for each tube to give a full reading on the meter.

Activity Test

The cathode activity switch, S2, is then opened. This cuts in enough resistance to drop the voltage on the tubes by 10 per cent. After waiting a couple of minutes for the tube to stabilize at the lower voltage, the rotary switch is again turned around to each tube. The new reading on the meter is read as a percentage of full scale.



A home made tube ager and emission tester. A dozen tubes can be aged or tested at one time. Switch on top of box reduces heater voltage 10 per cent. Jones plugs on front connect tester to another unit which contains the meter used. (Note see circuit diagram.)

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Tubes which show a new reading of 75 per cent or less of full scale are discarded.

The values shown in the accompanying drawing are for an actual test set which tests six 407A's and six 408A's at once. A similar set can be made for other tube types by using values copied from the circuit drawing in which the tubes are used. A meter is available which is calibrated directly in per cent, but any meter which reads 1 to 10 or 0 to 1 can be used. The resistor connected to S2 has two adjustable sliders, one is adjusted to give full heater voltage to the tubes; the other to give 10 per cent less.

The advantage of testing many tubes at once is the saving in time while waiting for the tubes to warm up in the tester, then cool down on the 10 per cent voltage reduction. In a large carrier or repeater installation this waiting time may be important if the systems are routined in off-peak hours.

Another advantage of home-made sets of this type is that they can be used for aging tubes. When new tubes are purchased, they can be placed in the set and "cooked" or aged for two or three days and then returned to stock. Many new tubes have sort of a super performance ability when they are brand new. They lose this quality after operating for a few hours. If a carrier is lined up with a brand new tube, it may drift out of adjustment as the tube ages. Therefore, it is desirable to pre-age tubes which are to be used in circuits where tube characteristics affect adjustments.

While an improvised arrangement like that mentioned above may suffice for routine tests of large numbers of similar tubes, a regular factory-built tube tester can be of considerable assistance where several different types of tubes are employed in the plant. If the tester is equipped with the cathode activity feature (or "life test", as it is called on some testers), a figure of 25 per cent reduction on the meter for a 10 per cent drop in heater voltage can be used as a standard unless manufacturers' specifications direct otherwise.

Power Tubes

There is some division of opinion regarding the testing of power tubes, or tubes which operate at a high temperature, especially if they are mounted in a horizontal position. This school of thought holds that the internal elements of the tube sag with the heat and become brittle. If removed from their sockets for testing purposes, the movement may cause the already distorted parts to short out, ruining a tube which would have remained OK if left in its socket.

In selecting a general purpose tube tester for a telephone office, a true dynamic mutual conductance instrument is the best test. Laboratory models are available which contain about eight or nine meters, and which enable the user to place practically any voltage on any electrode, and thus test the tube against the manufacturers' specifications as found in the tube handbooks.

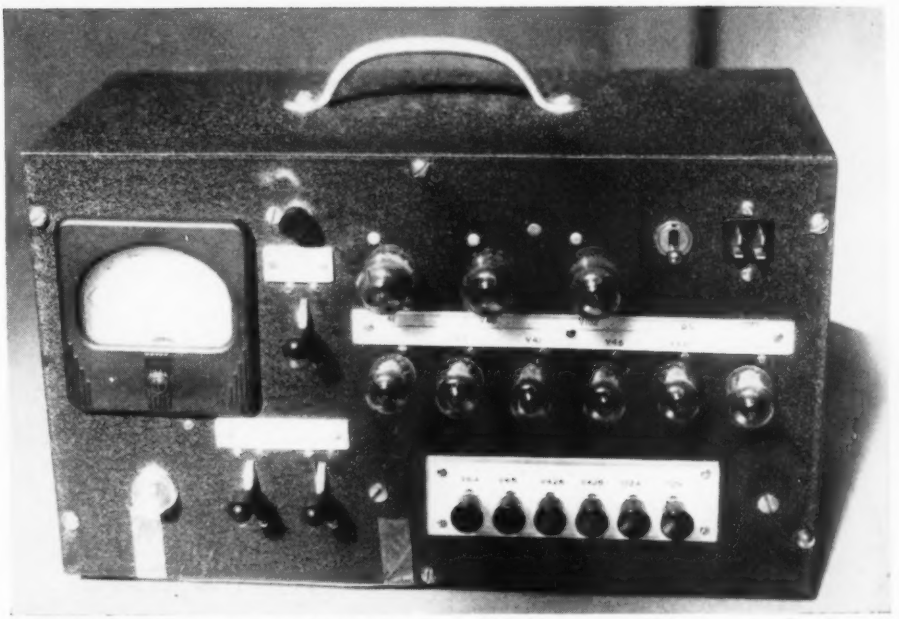
This degree of precision will ordinarily not prove in for telephone use. On the other hand, straight emission testers are suitable for cathode activity tests like the home-made one described, but are not the best for general purpose testing. This is because separate tests are not made on plate, screen grids, etc.

A good tube tester will usually have two rectifier tubes in it, one for plate and the other for screen voltages. Its ac dynamic signal will be in addition to the grid dc bias (some testers may merely use an ac bias on the grid, which is not as desirable). It will also have an accurate means of adjusting the voltage to conform to variations in the ac line.

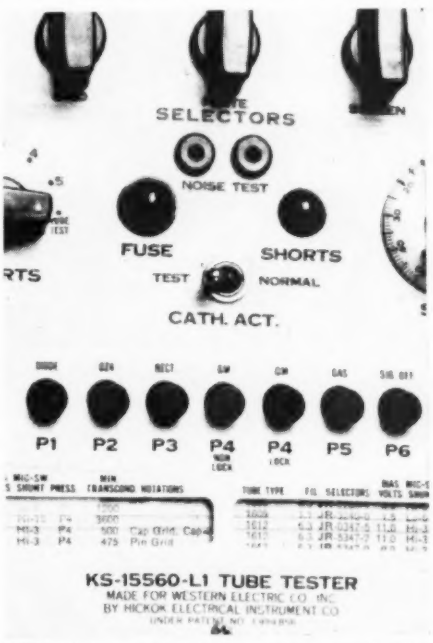
This matter is one of the points of difficulty in reconciling the results of a tube tester with the actual working circuit. A good tube checker will place exactly the right heater voltage on a tube, while the regular circuit may not. Thus, the tube may show OK on the tester but fail in the circuit which has a subnormal voltage on it. This is a particular failing in radio sets which use series filament strings.

Further information on tube testing and circuit diagrams of different testing circuits can be found in "Dynamic Mutual Conductance Tube Testers," published by The Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, O., and in the "RCA Receiving Tube Manual, Series RC 16." The latter is available in radio stores for about 50 cents.

Those who own tube testers, the accuracy of which is in doubt can test the tester by sending a tube of the kind they use most to the manufacturer of the tester, who will calibrate the tube on a laboratory instrument. This tube will then be marked with its correct transconductance. When it is returned, the user can plug it into his own tester and see if he gets the same reading.



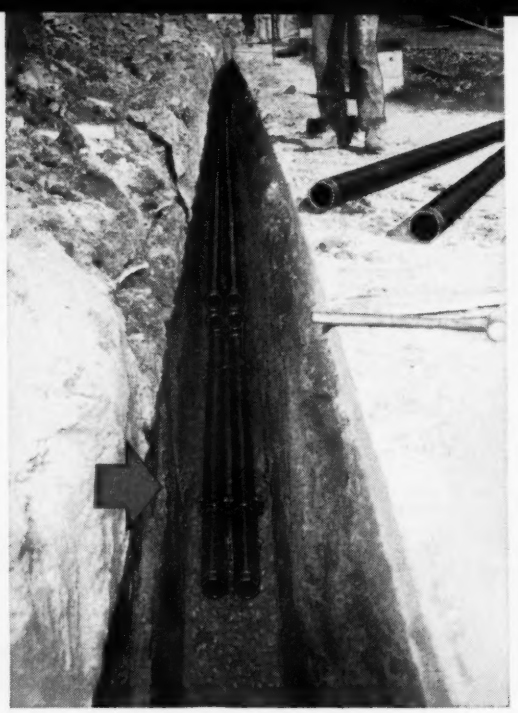
An improvised tube tester which uses push button to test each of several tubes in sequence.



This shows part of the front panel of a tube tester made especially for telephone company use. The "CATH. ACT." switch permits routine emission tests to be made. In addition, the instrument makes full dynamic mutual conductance tests of all tubes that may be found in repeaters, carriers, amplifiers or other items of electronic plant.

Economical Trench Width

Backhoe bucket is only 14 inches wide. Although too narrow for fabricating other types of conduit, trench provides adequate room for joining L-M Permaline. Equipment costs and man-hours required for narrower excavation are reduced.



Evenly Aligned

Prefabricated base and intermediate spacer units keep conduit rigid and evenly aligned. Spacers have special locking feature to make any combination of duct and configuration.

No Waste

Smooth precision tapers can be cut in field with L-M's portable tapering tool. This device makes possible 100% salvage of saw-cut ends. A simple, friction-lock vise is also available to hold conduit rigid during tapering.

Easy to Handle and Install

L-M's Permaline is light, easy to handle. Joints can be quickly and easily made by simply tapping the tapered coupling onto the tapered end of the conduit to make a strong, watertight joint.

Get Complete Information

Ask the L-M Field Engineer for a copy of Bulletin UG1A which contains full information about L-M Permaline Conduit. If you want installation specifications and instructions, L-M offers an Underground Handbook at $1.00—ask the Field Engineer. Or write Line Material Co., Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

BPI BITUMINOUS PIPE INSTITUTE

This seal is your guarantee of recognized quality in Bituminous Fibre Conduit.

LINE MATERIAL Permaline

A McGRAW ELECTRIC COMPANY DIVISION

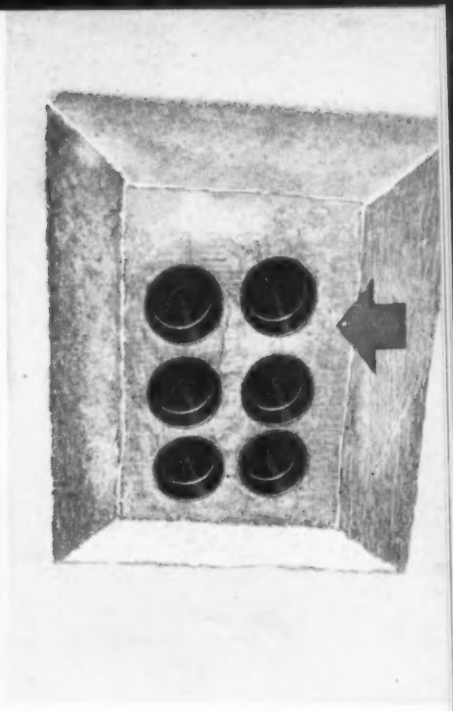
XUM

Less Concrete

Complete concrete encasement is accomplished with less material at lower cost. This is because Permaline's ease of installation makes possible a narrower trench requiring less concrete.

Complete Line of Fittings

L-M provides a complete line of fittings to fabricate any shape, and to work around any obstacles encountered in the field. Bell ends shown here provide a smooth, abrasion-free bore at conduit terminals in manhole.



Smooth Bore Speeds Pulling

Here is completed 6-duct terminal of Permaline Fibre Conduit, ready for 909-pair telephone cable. L-M's Permaline Conduit has a smooth inner bore so cable will be easy to pull and sheath will not be cut or marred.

How L-M's Permaline Conduit Cuts Costs, Saves Man-Hours on Telephone Installatio

Light, easy-to-handle Permaline Fibre Conduit reduces installation time. Permaline Conduit permits use of narrow trenches; saves concrete and man-hours required to dig and backfill.

Gulf Coast Line Contracting Company, Inc., New Iberia, La., recently installed a 6-duct telephone cable run 4000 feet long for 909-pair cable, using approximately 25,000 feet of L-M Permaline Fibre Conduit.

L-M Permaline Conduit is a bituminous fibre tube with exceptionally high crushing, impact, and tensile strengths. It is chemically inert and impervious to all soil acids and alkalis.

Fast, Labor-Saving Installations

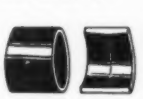
L-M's Permaline Conduit is light, easy to handle in the material yard and on the job. It comes in long 8-foot sections with a taper on each end. Joints can be quickly and easily made by simply tapping the tapered coupling onto the tapered end of the conduit. Joints are watertight and safe from seepage of wet concrete and soil water.

The longer lengths and easy method of joining permit the use of unusually narrow trenches and small tunnels. This results in savings in cost of concrete and man-hours required to dig and backfill the excavation. It is also possible to join many lengths of L-M's Permaline Conduit above the ground. The long sections can then be handed into the trench.

Everything You Need

L-M offers a completely engineered system for conduit installations. Accessories include:

- Five-degree angle couplings for offsets and long-radius curves.



- Five-degree multi-use bend sections for making short-radius turns without nipples.

- Long, smooth 45- and 90-degree elbows providing a variety of curves for bends and vertical risers.

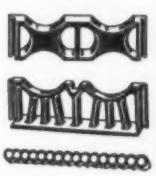
- "S" bends for long-radius offsets up to 20" without constricting the drawing-in of the cable.

- Caps for sealing duct ends from foreign matter during construction.

- Bell ends for use at conduit terminals in manholes.

- Plugs for spare conduit terminals to prevent ducts from being filled with dirt, dust, or other foreign matter.

- Base and intermediate spacers and long-bend spacer bar make it easy to get good alignment in tiered installations.



- Tapering tool makes it possible to taper the conduit in the field and provide 100% salvage of saw-cut ends.

Fibre Conduit

Sold for L-M to the independent telephone industry by

KELLOGG Switchboard and Supply Company

AND

THE NORTH ELECTRIC MANUFACTURING COMPANY

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A B C of the Telephone

by Frank E. Lee

HOW MANY pole holes does a telephone company have to dig in a year before it can afford to buy a power digger?

Or, to rephrase that question:—How many pole holes does a telephone company have to dig before it can't afford to be without a power digger?

In either case the answer is more than 150 holes a year—and this in spite of the fact that a small crew of men equipped with a line truck, derrick, winch and a husky earth boring machine can dig holes and set poles at the rate of 60 to 70 per day.

This amazing demonstration of how the use of power equipment can speed outside plant construction means a whole lot to the telephone company. In fact, there's more to it than the mere fact that 60 or 70 poles can be set in a day. First of all, consider the public relations impact of being able to set almost three miles of poles in one day. (Sixty poles spaced 250 feet apart will cover a distance of 15,000 feet.)

The public relations impact is created by a company doing things to serve people. When a customer or, as is usual, a group of customers in a new community is waiting for new or improved telephone service there is nothing more reassuring to them than to see the telephone company in action. Watching a new telephone building under construction, or reading about new equipment additions in the local paper, is good.

However, for the impact that makes folks sit up and take notice, the company should demonstrate skill, speed, and efficiency in the construction of new outside plant facilities. The outside plant is a tangible link direct to the customer's home or place of business. The new line takes on a great deal of personal importance to the customers who will use the new service.

The demonstration of the ability to serve an exchange area is one benefit gained by speeding a construction job by using power equipment. It has been mentioned first because very often this particular benefit is not fully appreciated. Using equipment that can set a large number of poles in a day means considerable savings in construction and maintenance time. This means savings in building new plant as well as savings in maintenance costs.

PART 78. OUTSIDE PLANT CONSTRUCTION—Section 4. Section 1 (TELEPHONY, Nov. 17) covered planning of additions to outside plant. Section 2 (TELEPHONY, Nov. 24) discussed laying out the pole line, grading requirements, and gave a résumé of clearances to be observed in outside construction. Section 3 (TELEPHONY, Dec. 1) covered poles, their selection, treatment, handling, storage, and gaining.

In an article, "Power for Small Telephone Companies," which appeared in the Feb. 25, 1956, issue of TELEPHONY, John R. Fox, owner of the Waldron (Mich.) Telephone Co. presented some interesting information on the advantages of power equipment on the outside plant construction job. A few of the many important facts mentioned by Mr. Fox are:

(1) After a dry summer the ground along a proposed new pole line route a mile long was so hard and dry work had to be stopped because it took too long to dig just two holes by hand.

(2) When a new hole digger was put on the job the story was entirely different. Mr. Fox and his crew had to learn how to use the digger before they could begin work, however, on the first day they set the entire mile of poles.

(3) The new line was completed in short order and they had time for other construction and repair work. According to Mr. Fox, the derrick to handle the poles wasn't added until 18 months later. Thus, the original performance of the new piece of power equipment was even more remarkable because it takes time and energy to set poles by hand.

(4) From a cost standpoint, Mr. Fox stated that with the power digger two men could dig a pole hole in 10 minutes which would take two hours by hand. Comparing total man hours, the digger took 20 minutes or one-third of an hour, and hand digging would have taken four hours. At a rate of $2.00 per hour this results in a comparison of $8.00 with 66 cents. The net saving is $7.34 per pole.

TIME TO DIG POLE HOLE

By Hand in Hard Dry Soil — 2 men	**2 hrs.**
Total 4 Hours @ $2.00	**$8.00**
* * *	
With Digger — 2 men	**10 min.**
Total 1/3 Hour @ $2.00	**66 cents**
Savings Per Hole with Digger	**$7.34**

Considering this $7.34 savings per pole, a power digger can save between $440 and $520 per day. Figured on a construction basis as low as 150 poles per year the time savings adds up to around $1,100 per year. Thus, the power digger will pay for itself in a very short period of time.

There are a number of hole diggers and pole setting derricks on the market. Some are designed to mount directly on the flat bed of a truck. A typical digger of this type is shown in *Fig. 1*. This digger is equipped with a short flight type of earth auger. To clear the loose dirt from the auger, the operator will spin the auger while it is above ground and the dirt will be thrown clear of the auger into a pile surrounding the hole.

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Fig. 1

The upright portion of the auger also serves as a derrick boom which can be used to lift and set poles. When necessary to travel along the highway or even from one pole location to another, the derrick can be lowered as shown in *Fig. 2.* By tilting the digger at an angle, generally sideways of the truck, it can be used to dig holes for placing pole anchors. Various methods of placing anchors will be discussed later in this series.

A digger suspended by a steel cable from a truck mounted derrick is shown in *Fig. 3.* This digger is equipped with a long flight type of earth auger. With the derrick support this type digger can be swung out over a ditch or similar obstacle. Diggers of this general style can be mounted either on the front or rear of a standard construction truck. A front-mounted digger is illustrated in *Fig. 4.* A rear-mounted digger is shown in *Fig. 5.*

Fig. 2

Still another variation of the digger-derrick combination is illustrated in *Fig. 6* (shown on p. 30). The digger has been mounted on a familiar track-type tractor. Units of this type have many advantages on severe off-highway operations as would be encountered in building lines away from the highway over rugged terrain. In many instances, a digger has been mounted on a medium or large size farm type tractor.

Another good example of the versatility of a derrick mounted digger is shown in *Fig. 7.* Here the truck has been backed off the highway and the derrick extended over the fence to dig a hole on a private property right-of-way. Under most soil conditions, the weight of the digger mechanism alone is sufficient to force the auger into the ground. The operator guides the digger to the correct spot and under his control the digger does the rest. Note that the digger is suspended from the derrick winch line.

In some locations the ground may be extremely hard. This could be caused by the general type of soil, or an extended dry spell which will harden what normally is an average type of soil. If the ground is too hard the weight of the digger alone may not be

(Please turn to page 30)

Fig. 3

Fig. 4

Fig. 5

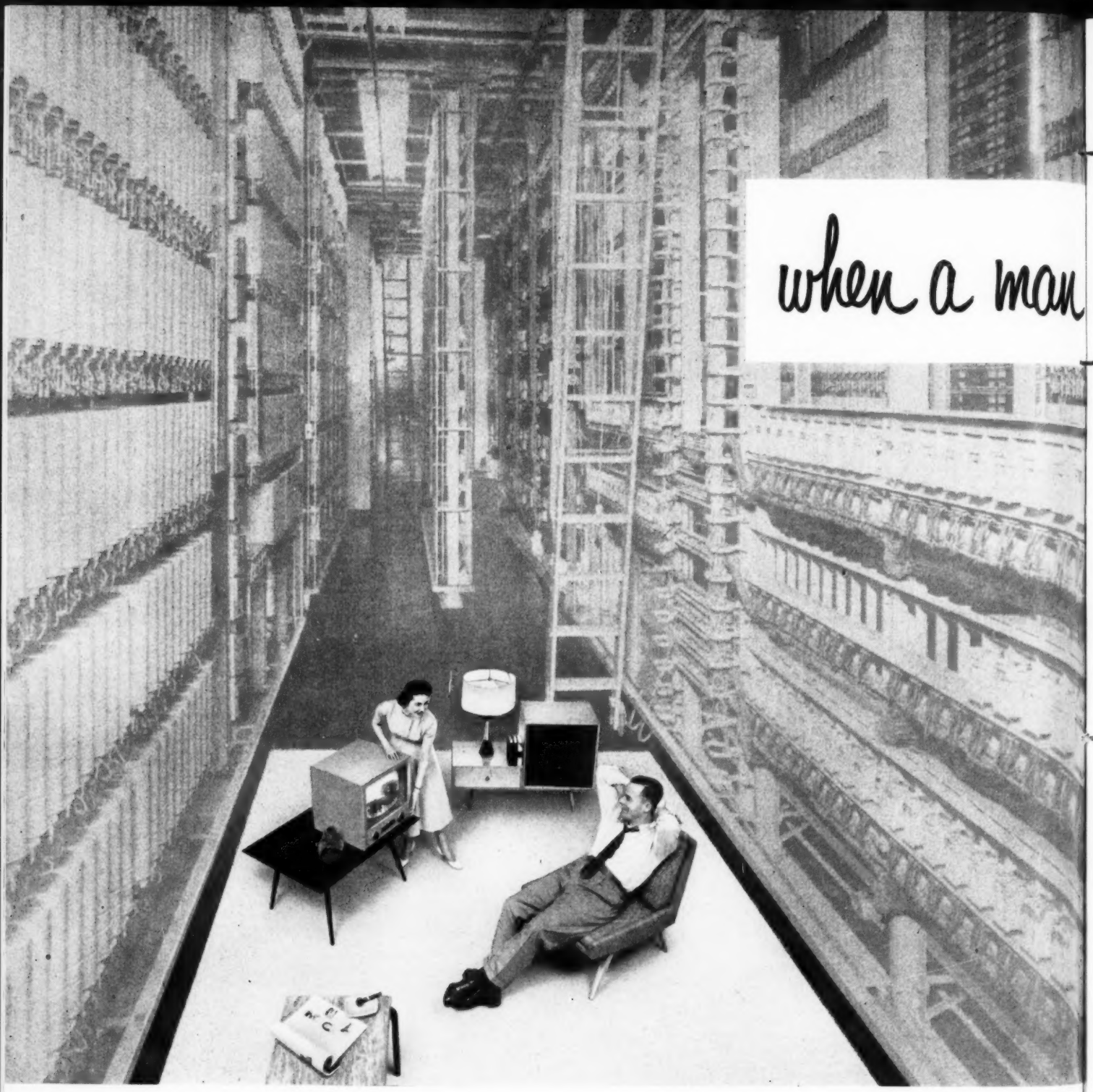

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Fig. 6

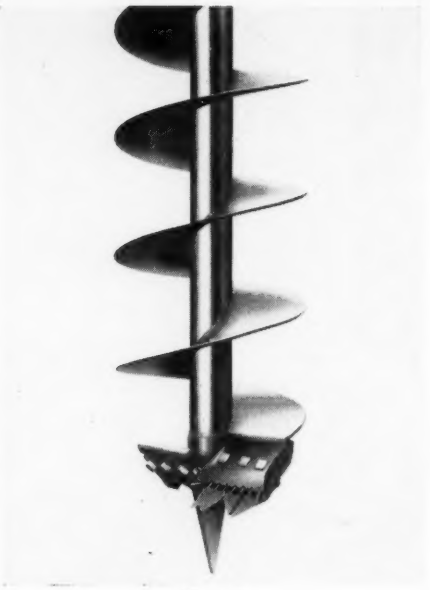

Fig. 9

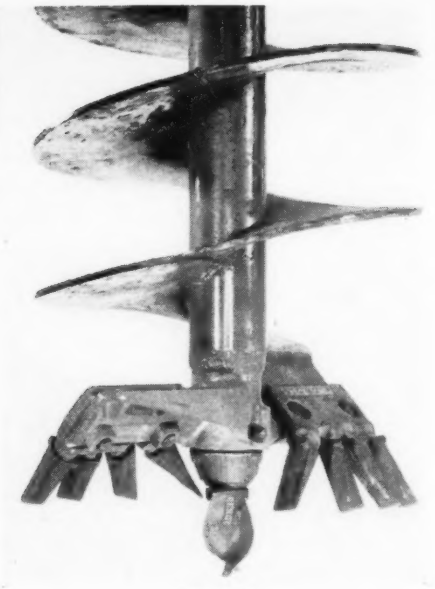

Fig. 10

enough to force the auger of a derrick mounted digger into the ground.

Fig. 8 illustrates a convenient way of adding to the down pressure on the auger bit. The digger has been coupled to the derrick boom and the pole has been raised from the ground by the winch line. By releasing the boom line the weight of the boom and the pole is added to the weight of the digger.

The type of digger to buy, and the type of vehicle on which it should be mounted, can be determined by studying the various manufacturers equipment available on the market. There are types and sizes available to fit practically any operating company budget.

Speaking of budgets and whether or not a small company can afford to buy a digger and pole setting outfit—what should such a company do if it has less than 150 poles to set in a year? Setting 50 or 100 poles a year still is a lot of work.

When faced with a problem of this type it is well to keep in mind that a neighboring company may be confronted with the same problem. If two or three small companies in a given area each cannot prove in the purchase of a digger of their own they should investigate the possibility of buying the equipment as a joint project.

This procedure would reduce the investment for each company and also would enable each to take advantage of the savings made possible by using the equipment. Scheduling the use of the digger can be worked out to the benefit of all the owners.

Augers for earth boring machines are available in various types and sizes. Typical sizes of augers used to bore pole holes are 12 inch, 14 inch, 16 inch, and 20 inch. Smaller augers, 8 inches, 9 inches, and 10 inches in diameter are for use in boring small anchoring holes which usually are at an angle. A closeup of a typical auger is shown in *Fig. 9*. A typical drilling head that can be welded to practically any auger is illustrated in *Fig. 10*.

As can be seen in *Figs. 9* and *10*, auger bit cutting heads usually are made with replaceable parts. Pilot bits on the augers keep the auger in line as it drills down through most any type of soil, roots, and any similar obstructions. Augers in earth boring machines also have definite advantages over hand tools in digging holes in sand, swamp, and quicksand.

Derricks Handle Poles Easily. The advantage of using power equipment doesn't end with digging the pole hole.

Fig. 7

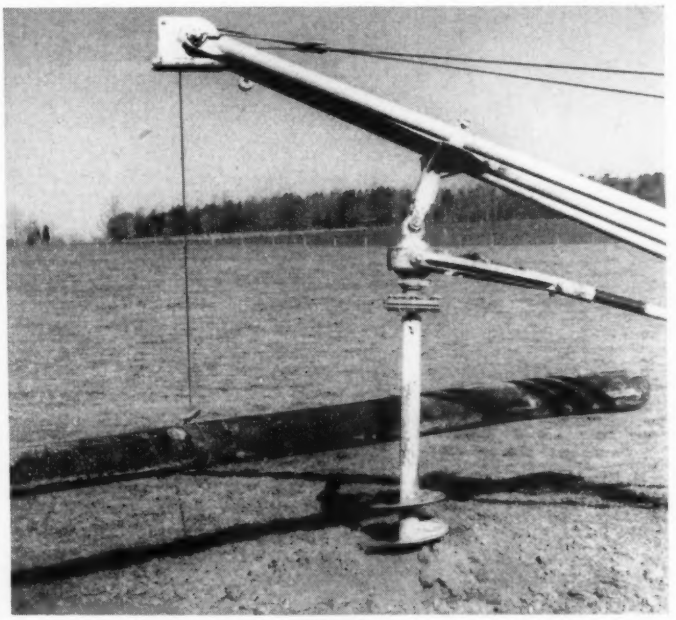

Fig. 8

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Derricks mounted on trucks or tractors enable a construction crew to erect and set poles faster and safer than if they are pushed into position with pike poles. Instead of using a number of men to do the job the pole is raised above the hole with the derrick. As the pole is lowered, one man can guide it into position in the hole.

Depth of Setting Poles. How deep a pole should be set is determined largely by the length of the pole, the load to be placed on the pole, and the type of soil in which the pole will be set. Two poles of the same length but cut from different types of trees would be set the same depth in the ground if both were being used under the same conditions. The standard depths of setting for poles of various lengths are as shown on *Table 1* in which all dimensions listed are in number of feet.

Poles have to be set in all types or conditions of soil, namely, loose, solid, rocky, and similar classifications. In these classifications the only consideration is the degree of support the soil provides for the pole or group of poles. Obviously, there are many degrees of looseness, solidity, and even in the rockiness of various soils.

For example, a rocky soil might be clay or black dirt combinations in which medium and large boulders or rocks lie on or near the surface. Another type of rocky soil could be a combination of a thin layer of top soil over a deposit of shale or similar stone. The term rocky soil could also be given to a situation where solid rock is covered by a layer of dirt which may vary in depth from a few inches to a number of feet.

Where solid rock is encountered, the depth at which the solid rock is struck has a bearing on the depth of hole required for the pole. A typical chart showing this information is shown in *Table 2.*

Pole Length	Depth of Setting In Average Soil	In Rock
16	3½	3
18	3½	3
20	4	3
22	4	3
25	5	3
30	5½	3½
35	6	4
40	6	4
45	6½	4½
50	7	4½
55	7½	5
60	8	5
65	8½	6
70	9	6½
75	9½	6½
80	10	7

Table 1

DEPTH POLES ARE SET IN SOLID ROCK

Depth Ground Line to Solid Rock in feet	Length of Pole in Feet								
	20	25	30	35	40	45	50	55	60
0	3	3	3½	4	4	4½	4½	5	5
½	3	3½	4	4	4½	5	5	5	5½
1	3½	4	4	4½	4½	5	5	5½	5½
1½	3½	4	4½	4½	5	5	5½	5½	6
2	4	4½	4½	5	5	5½	5½	6	6½
2½	4	4½	5	5½	5½	5½	6	6½	6½
3	4	5	5	5½	5½	6	6	6½	7
3½	4	5	5½	6	6	6	6½	7	7
4	4	5	5½	6	6	6½	7	7	7½
4½		5	5½	6	6	6½	7	7	7½
5		5	5½	6	6	6½	7	7½	8
5½				6	6	6½	7	7½	8
6				6	6	6½	7	7½	8
6½						6½	7	7½	8
7							7	7½	8
7½								7½	8
8									8

Table 2

Setting poles in loose or swampy soil requires a deeper setting than when the poles are set in average or rock soil. Also, there are occasions when the depth a pole is set in average soil may be less than normal. The depth at which a pole may be set under these or other special conditions are as follows:

(1) Set poles 1 to 2 feet deeper than average in loose ground or in swampy soil.

(2) Set unguyed corner poles 6 inches to 12 inches deeper than average except when they are set in solid rock.

(3) A pole of 25-feet or less in length, supporting an exchange distribution cable, may be set to a depth of 3 feet if necessary to obtain clearance. This, of course, applies only to one or two poles and not to a long row of poles. If more than two poles are involved a longer pole should be used to provide the proper clearance.

(4) A guyed pole carrying exchange distribution cable can be set 1 foot less than recommended when necessary to provide individual clearances. This generally will result in a deeper setting than covered in Item 3 above. However, inasmuch as the pole is guyed, it is reasonable that the pole itself should provide as much stability as possible.

(5) Poles set on a sloping bank or hillside or within 5 feet of the edge of a bank should be set approximately 18 inches deeper than the standard depth. The reason is quite apparent because there is a loss in stability or holding power of the soil on the downhill side from the pole location.

How to Determine the Depth a Pole is Set. When a pole is set, certain precautions should be taken to be sure it is set to the specified depth. However, this does not mean that the depth a pole is set should be exactly 6 feet or exactly 7 feet. There is no question that a pole could be set at an exact depth. However, it would be rather impractical to insist that each pole be set to an exact depth in the ground. Instead a tolerance of plus or minus 3 inches or some similar measurement would be more practical.

A tolerance of plus or minus 3 inches means the pole could be set 3 inches deeper than specified or 3 inches shallower than specified. When applied to a 25-foot pole to be set at a depth of 5 feet, this means the actual depth may be between 5 feet 3 inches and 4 feet 9 inches. The depth a pole is set can be checked quite accurately, either when it is being set or after it has been set. The depth an auger is in the ground can be determined with a high degree of accuracy by placing marks on the auger or digger drive shaft.

After digging a few holes a digger operator should be able to control the depth of setting with a high degree of accuracy. For this reason, there is no need to withdraw the auger and delay the digging operation while a check is made of the exact depth of the hole.

After a pole is set in the ground the

(Please turn to page 46)

XUM

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THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

WE HAVE been advised by many of our readers that they have made use of the open cable pair test, described on this page some time ago, with complete success. A few, however, have reported failures. The readers having success with the test have suggested the following points which should be observed and we pass them along with the hope that they may prove helpful to the less successful.

When this method is used to locate an open pair in a dead cable, all of the cable conductors should be bunched and grounded at both ends. The good conductor of the open pair should be inclined in this grounded bunch.

Place tone on the open conductor at one end to ground. Now connect a dissimilar sounding tone in the same manner on the other end of the open conductor. It has proved highly desirable to use two definitely dissimilar tones so that they may be easily recognized.

The same technique, in so far as possible, should be used in locating opens in working cable. Bunch and ground at both ends of the section of cable under test as many pairs in the group or count as possible. This proves highly desirable in reducing the tone carry-over to adjacent pairs.

If the open fault to be located is between two terminals or the main frame and one terminal, this makes an excellent point to bunch and ground the vacant pairs.

It is not believed that any particular type of tone set is required to successfully use this method of fault location. The Western Electric #76-C, the 109 Oscillator, and others, are all considered satisfactory.

If a variable oscillator is used, it has the advantage of being capable of generating almost any audible tone frequency. A buzzer type tone, either interrupted or straight, is also considered very good.

A tone frequency should be selected that is definitely different in sound from any cable noise that can be picked up by the exploring coil and amplifier.

Regardless of the type tone used, it is most important that it be equipped with a volume control. If your set is not so equipped, any radio store can supply a variable resistor at a reasonable cost which may be used for this purpose.

When the tone has been placed on the open conductor, make the first test on the cable several feet from the tone set with the exploring coil and amplifier. This will assure that the tone heard in the headset is coming from the cable and not from the tone set direct.

After the tone has been recognized on the cable, lower the volume until the tone is only faintly but distinctly heard. This is most important. If the tone volume is too high, it will carry over from the defective conductor to adjacent good pairs and carry the tester beyond the open.

Recognizing the correct tone volume may prove rather difficult at first, but be patient and persistent until you acquire the knack, for it is the key to the success of this method.

If the tone volume is too high, it will carry over the trouble, and if it is too low, it will fade out before the trouble is reached.

After the correct tone volume has been obtained, next select a location about midpoint in the cable section under test for listening with the exploring coil. The tone picked up at this point will indicate which end of the cable is good. A second test should then be made about midpoint of the section away from the recognized tone.

Eventually the tone being followed will be lost and the tone from the opposite end of the cable will be heard. Careful listening with the exploring coil will then trace the trouble down to the exact location of the open.

Although this is perhaps not as easy as it sounds, we sincerely believe that with a little patience you will be extremely successful.

It is believed, too, that those of our readers who did not experience complete success with this system either did not have sufficiently dissimilar tones or had tone volume that was entirely too high. Some may have failed also for the reason that they did not use any amplifier on the exploring coil.

•

In our humble opinion the use of gay colors in this country is here to stay and never again will we revert to the old foggy half-tones of past years.

Many predicted that this year's new models of automobiles would revert to the few standard colors of yesterday. However, our observations to date indicate that this is not true and the new models are even more colorful than ever before.

All this would seem to indicate that the beautiful new colored telephones now available will probably be with us for a good many years into the future.

•

We enjoyed a demonstration lecture recently given by Cyril N. Hoyler at the David Sarnoff Research Center of the RCA Laboratories at Alexandria, Va.

The light amplifier was demonstrated and explained. A very small, lightweight transistorized television camera was in actual operation and proved most interesting. We saw photographs reproduced electronically.

Perhaps the most interesting demonstration was electronic refrigeration. A small ice cube was frozen in a few minutes right before our eyes in a device without moving parts. Current passed through a contact of dissimilar metals in one direction produced cold and when the current was reversed the junction of the two metals generated heat.

It is our private opinion that we should never be surprised at anything these days, because anything can happen.

XUM

Section 26 (Continued)

There are certain faults that must be guarded against. You should learn to control your vanity. While you may never imagine yourself as vain or conceited, you must be constantly on your guard against being too quick to notice such imperfections in others.

Above all, don't be "bossy." You are a very important person in the lives of the PBX attendants you supervise. You are looked up to as a person of authority—and the telephone company itself. Get your suggestions across to the attendant in such a way that she will want to do as you counsel.

Learn to control your temper. Everyone loses respect for the person who is always "blowing her top." If you feel your temper is about to reach the boiling point, get away and allow it to cool off. Above all—never make a decision when you are angry or upset. Keep your emotions under control, and a tight rein on your personal likes and dislikes. Hold your tongue, do not speak until you know the facts and then do not talk too much nor too loud.

Control your thoughts and don't make hasty decisions that may cause you embarrassment when you have to change them later. And above all, don't be petty or over-critical.

Don't be too "soft" and fail to act when it is necessary, ignoring repeated failures to do work correctly. But when you do correct, keep away from sarcasm and unkind remarks.

Never be completely satisfied with the job you are doing—once you are, you will stop trying. Always set your sights for a goal that is a little above what you think you can accomplish.

Knowing Your People

The better a PBX Service Adviser knows each one of the attendants she works with, the easier she will find a way to give the help needed for a good job. In addition to wanting the PBX attendant to be a good operator, strive to help her to get all she can out of the job in the way of personal satisfaction.

How can a Service Adviser get to know her PBX people? By the very simplest of means—through observation and study. Ask yourself these questions:

What do I think of her as a PBX attendant?

What kind of a job is she doing?

How can I help her do a better job?

How well do I know her?

Does she like to stay on one job or does she like to move from PBX to PBX?

Are there some things about the job she does not like?

Does she have outside interests and hobbies?

Is she sensitive? If so, on what subjects?

Of what qualities, abilities, possessions, etc., is she proud?

The important thing is that you study each of your attendants. If you do this carefully, each attendant will feel that you are sincere and she will be given credit for what she does.

Why is it necessary to study or observe your PBX people? Certainly not to find fault. No, that isn't the reason. It is to find her training and development needs in order that you may guide and counsel her to meet these needs—to encourage the attendant and improve her sense of security by knowing how she stands, and to assure her that she is being recognized and not being overlooked.

There are a few common mistakes one is apt to make when directing people. Sometimes the important things are not considered. Often, the too few or too many petty items are brought up but not the really important ones. We might, especially with the "poorer" attendants, have a tendency to judge a particular situation or problem with our general impression of the girl. When different people rate the same person, they do so under different standards. That is, cooperation to one person may look like lack of initiative to another. Bias or prejudice—particular likes or dislikes for certain traits—often influences an opinion or judgment.

How can we guard against mistakes in rating or judging people? We can make sure the attendant has the proper training before judging her. We can avoid the "perfect example" as a standard and compare the individual with the average. We should never let our opinion of her work of today be influenced by her past mistakes.

How can we help the attendant believe that her efforts are being recognized—that she is not being overlooked? It is important that the girl know how you feel about her work. Tell her how you think she rates in certain service items and encourage her to work toward her own development. But, why should you do this? Because it gives the attendant an understanding of her strong points and her weak points. Too, it gives her an opportunity to express herself and give her views concerning her job.

You can observe the attendant's work visually or by service reviews and note any improvement and tell the girl about them. The important thing is—you take seriously the matter of judging others. Each attendant should be given full credit for what she does. Look for what is good in the attendant and tell her of the good things you observe, but be slow in offering suggestions until you know the girl.

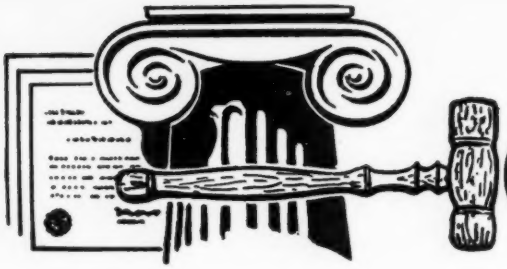
It can't be expected that all attendants will be top performers. It just isn't in the cards. You must recognize that people are different, that everyone does not react to suggestions in the same manner. If you know and understand your PBX people, treat each one as an individual, you will find your job much easier and certainly more pleasant and interesting.

When your attendants feel that you know and understand them as individuals, feel that you are trying to help them enjoy their work and make their job easier for them, you'll find them not only welcoming your assistance but actually seeking it. They will look to you for advice and will not resent your questions, because they know you are not trying to pry into their personal affairs.

The average girl is not too difficult to understand and she will appreciate your interest in her. For the few who seem difficult to know, you can get valuable help from her boss and the people she works with. Study an attendant's good points. Find out what she responds to favorably. Above all, be very patient with her while you are studying her. She may be intelligent but mischievous. She may have the know-how but be unable to express herself.

We must repeat—each attendant is an individual who may react differently from any other we may work with. She may vary in her reactions to the same conditions on different days, depending upon her mood. It is your job to keep her interested and happy in her work and proud of the good job she is doing.

(Section 26 to be continued next week)



Courts and Commissions

Neb. Company Authorized to Raise Rates, Issue Stock

The Midstate Telephone Co., Hartwell, was authorized by the Nebraska Railway Commission recently to establish the following schedule of rates, (TELEPHONY, Sept. 1, p. 44), to be effective with the conversion of the exchange to automatic operation:

One-party business	$5.25
One party residence	4.75
Two-party residence	4.25
Four-party residence	3.75

The order also authorized the company to issue 600 shares of 6 per cent preferred stock at $25, to provide funds for the automatic conversion. Present capitalization is 1,400 shares of common stock, par value $25, of which 552 shares have been issued and 600 shares of preferred stock, none of which has been issued.

Extended area service to Kenesaw and Norman was ordered discontinued. Studies showed insufficient use of the facilities.

The company was given permission to sign and deliver a conditional sales contract to the Stromberg-Carlson Co. as a condition of purchase of automatic equipment. Total cost of equipment for the 100-station exchange is $11,646.80, of which 10 per cent is to be paid in cash and the balance in 60 monthly installments. Interest at 6 per cent will accrue on the unpaid balance of the principal.

Three Companies Merged to Form General of Missouri

The Missouri Public Service Commission authorized the Missouri Telephone Co., Columbia, on Nov. 22 to buy out the Andrew County Mutual Telephone Co. and then merge with Middle States Utilities Co. to form the General Telephone Co. of Missouri. The sale, merger, and change of name became effective Dec. 1.

General headquarters for the new company will remain in Columbia, where all three companies now have their present headquarters.

The new company was granted permission by the commission to issue 9,000 shares of common stock, par value of $25 a share, to be given Middle States' stockholders for their present stock.

Authorize 5.42% Return For Florida Company

New rates for the Starke Telephone Co., designed to increase the company's rate of return from .95 per cent to 5.42 per cent, were approved on Nov. 29 by the Florida Railroad & Public Utilities Commission.

The company had earned $1,796 on a rate base of $190,010. With the rate increases net operating income is expected to rise to $10,293. Following are the approved rates:

One-party business	$6.50
Two-party business	5.75
Five-party business	5.00
One-party residence	4.50
Two-party residence	3.75
Five-party residence	3.00

Co-op Competition Issue Reopened in Texas

The Texas Supreme Court agreed on Nov. 21 to reopen a test case involving competition between a private electric company and a rural cooperative.

Such a review was requested by State Attorney General John Ben Shepperd, numerous utility companies and the League of Texas Municipalities. Fifty-five rural electric cooperatives and the city of Gilmer are on the other side.

The high state court last August refused to accept an application to review the opinion of the Austin Court of Civil Appeals, which had held that Upshur Rural Electric Cooperative could operate in Gilmer, after the city annexed an area served by the co-op.

Gilmer already had granted Southwestern Gas & Electric Co. a franchise, and it then gave permission for the cooperative to also sell electricity in the annexed area.

Shepperd and lawyers for the private utilities contend that the Civil Appeals Court decision is "nothing more or less than a judicial rewriting" of previous law. They further argued that the result is contrary to the aims of the rural electrification program.

"Rural electric cooperatives under the statute (as interpreted by the Court of Civil Appeals) are free to operate within such 'rural' areas as the cities of Houston, Dallas and San Antonio," Shepperd asserted.

Private companies argue that the cooperatives can not operate in towns of more than 1,500 population.

The Civil Appeals Court held that cooperatives "once organized can not be restricted with respect to competition which must develop as areas served by electric cooperatives and commercial power grow together and overlap."

"Exclusive territory franchises," the court said, "are contrary to the constitution and anti-trust statutes."

Nebraska Independent Granted Rate Raise

The Glenwood Telephone Co., Blue Hill, was authorized recently by the Nebraska Railway Commission (TELEPHONY, Sept. 1, p. 44) to establish rates at Blue Hill, Roseland, Holstein, Rosemont, Cowles and Bladen as follows (rates given are for metallic service; grounded service is 50 cents less):

Blue Hill:	*New*
One-party business	$5.00
Two-party business	4.50
Multi-party business (metallic only)	3.25
One-party residence	3.50
Two-party residence	3.00
Four-party residence	2.75
Rural residence	2.75
Roseland, Bladen, Holstein, Cowles, Rosemont:	*New*
One-party business	$4.25
Two-party business	3.75
One-party residence	3.50
Two-party residence	3.00
Four-party residence	2.75
Rural residence	2.75

In granting these rates, the commission altered the company's original proposal to provide a greater difference between rates for grounded and metallic service, and to prescribe the same rates for like classes of service between exchanges.

New rates are estimated to produce gross operating revenues of $45,395.97

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and expenses of $44,234.50. This would result in a net income of $1,161.47 or the equivalent of a rate of return of 1.04 per cent upon a rate base of $112,-043.89.

Deny Security Clearance to Former Wisconsin Employe

The U. S. Defense Department has upheld decisions by two security boards denying clearance to Steven L. Keznar, former employe of the Wisconsin Telephone Co. (Bell System) and president of a local communications union, it was reported on Nov. 29.

The Pentagon position was stated in a letter by Mansfield Sprague, Defense Department general counsel, dated Nov. 14, to David Shapiro, New York City lawyer who is representing Keznar.

The Wisconsin Telephone Co. late last year requested security clearance for Keznar because the company had several classified military contracts. Last Jan. 16, the report stated, the Pentagon Security Survey Board decided that clearance was not warranted and issued a notice of suspension of any existing security clearance for him.

The company gave Keznar 90 days leave without pay as time in which to resolve his difficulties. The company's action was challenged by Keznar's union but when the matter went to arbitration the ruling was in favor of the company.

Keznar then asked for a hearing before the Industrial Personnel Security Board in New York. After the hearing, held on May 31, the board decided to deny clearance to Keznar, according to the report.

Shapiro appealed to the Secretary of Defense who referred the matter to the general counsel.

N. D. Commission Approves Increase in Rates

The North Dakota Public Service Commission has approved a request of the Richardton & Taylor Telephone Co. for authority to increase rates in its exchange at Taylor upon conversion to automatic (TELEPHONY, Oct. 27, p. 96).

The company furnishes telephone service to 214 subscribers in its Richardton Exchange, and 101 subscribers in its Taylor Exchange.

The proposed rates after conversion of the Taylor Exchange will increase the company's operating revenue about $965.

Approves No Move-Charge For Colored Telephones

The Nebraska Railway Commission has approved an application of the Northwestern Bell Telephone Co., effective Dec. 1, to permit subscribers who move from one location to another in an exchange, or to another company exchange, to retain a colored telephone without another payment of the installation fee of $7.50.

The order also permits the changing of telephones from one color to another by merely paying the change of equipment charge, or the inside move charge. However, when a two-tone set is changed to a solid color set, there is a charge of $2.50 which represents the difference in the original installation charge. Spring cords in matching or harmonizing colors will be included without charge in installations of colored telephones.

Gets Missouri OK to Buy

The Chariton Valley Telephone Corp., Bucklin, on Nov. 24 received Missouri Public Service Commission permission to borrow an additional $699,000 from REA, and to buy and improve the exchanges at Salisbury, Huntsville and Musselfork (TELEPHONY, Nov. 10, p. 33).

A mule came to the rescue of the Sunland-Tujunga Telephone Co. of Sunland, Cal., in getting poles into a precipitous mountainous terrain, covered with California scrub oak and chaparral. The company was faced with the problem of placing 14,450 feet of cable over a mountain range. The cable route went up and down high ridges and across ravines which made it impossible to get any kind of motorized equipment into the area. To accomplish the job of getting poles into the rough terrain, the company rented a mule by the day to "snake" poles to their locations. The front cover cut shows the mule at work and above are pictured some of the company's personnel with the "long-eared beast of burden". Left to right: Allan R. Stacey, Orval E. Emley, Alfred Fortner, Don Ward, Franklin Hannan, Jr., Albert Jones, and R. T. Mellon.

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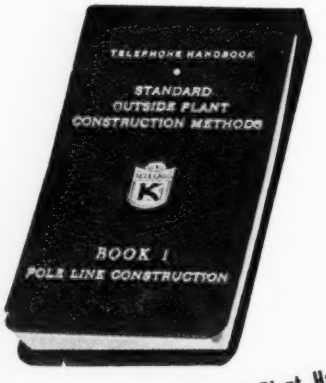

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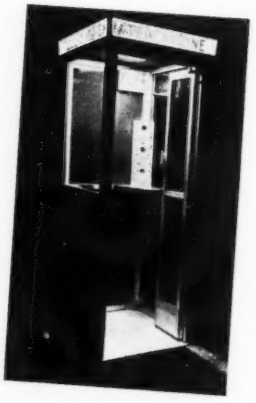

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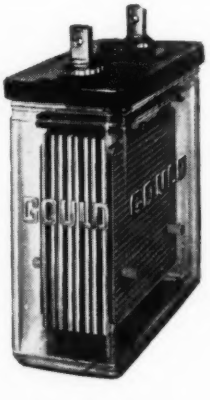

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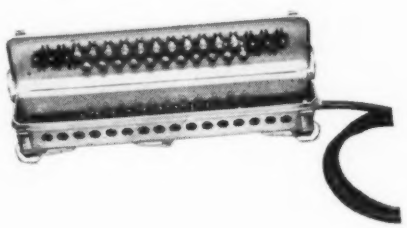

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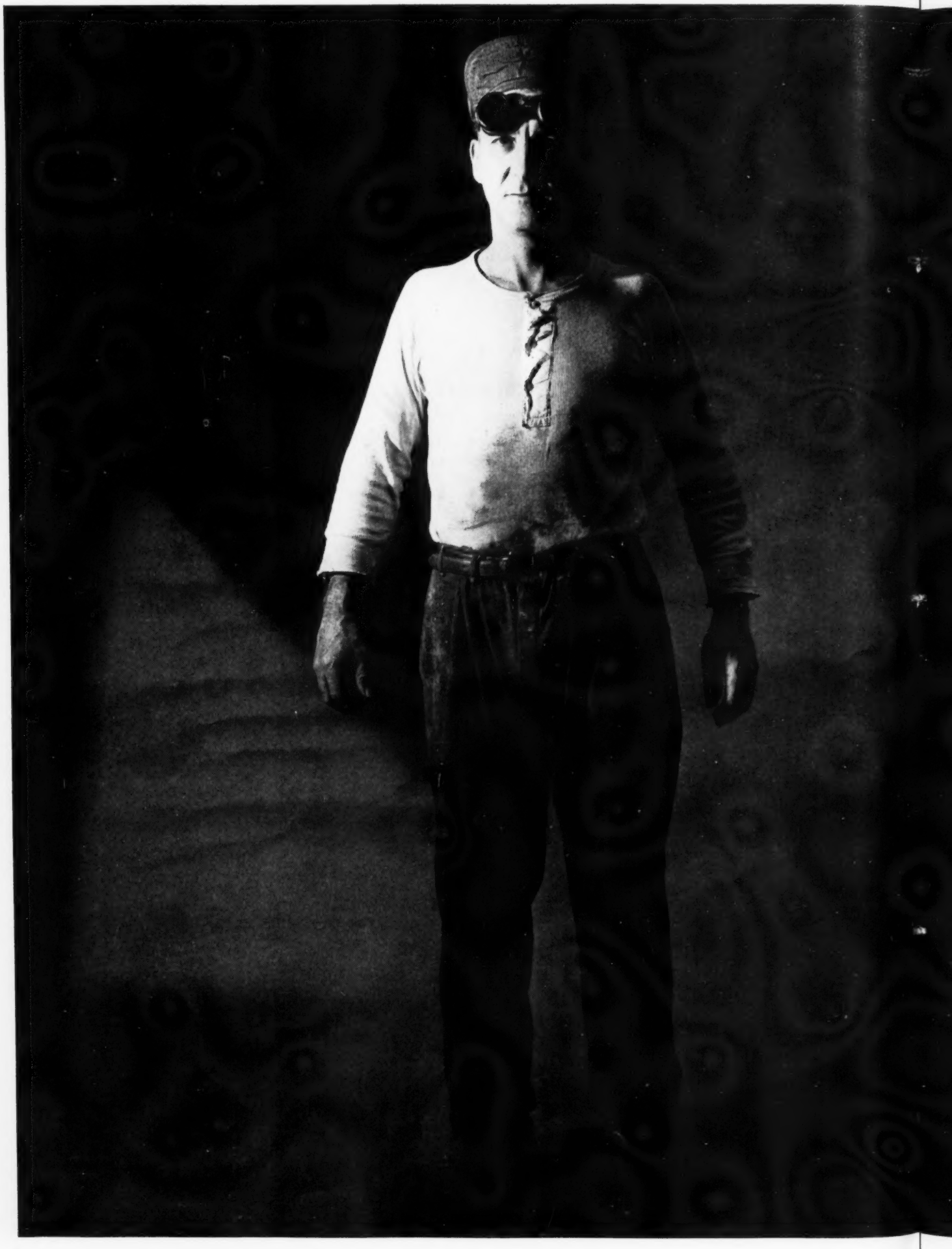

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IN THE NATION'S CAPITOL

Continued from page 20

tered a death blow to an emergency proposal offered by Gov. Frank J. Lausche to end the critical telephone blackout in the southeastern area of the state. The state house of representatives, by a vote of 110 to 0, rejected an administration-sponsored public utilities seizure bill and tossed the problem back into the arms of the governor.

The house action ended a three-day special session of the general assembly, called by Governor Lausche to find a solution to labor difficulties which have deprived the communities of all telephone services since Oct. 15.

The house accepted committee findings that there exists in Scioto County and the cities of Portsmouth and New Boston "an emergency affecting the health, welfare, and safety of the citizens of these areas as a result of a complete stoppage of telephone service." But it repudiated the seizure measure on the grounds that it was unconstitutional, unworkable, and would tend to weaken collective bargaining "to the detriment of labor relations in public utilities."

Governor Lausche (now U. S. senator-elect), in a statement issued after adjournment of the legislature, took solace in the conviction that "ultimate good will come from the calling of the special session." He expressed the hope that the Ohio Consolidated Telephone Co. will reopen its plants. He again promised "the fullest protection of law and order" to communities where frequent outbreaks of mob violence have occurred.

It is interesting to note the reasoning used by the Ohio state house judiciary committee because it may well reflect the fate in store for similar legislation which may be proposed hereafter in other states having utility strike trouble. The unanimity with which the Ohio house jumped on the governor's proposal clearly shows that neither those legislators ordinarily favorable to the recommendations of labor unions, nor those concerned with the fate of private enterprise in business, thought very much of Lausche's compulsory anti-strike approach. And that pattern, which revealed itself so strongly in the Ohio legislature, might very well reappear elsewhere under similar conditions.

In its report to the house, the judiciary committee, which recommended defeat of the seizure bill, found that the immediate cause of the disruption of service was "a serious breakdown of law and order in the areas concerned."

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The committee blamed local police and municipal and county officials for this breakdown of law enforcement. It said the situation was aggravated by the "adamant attitude" of the telephone company and its striking employes.

Governor's Proposal

Just by way of comparison, it might be noted that the defeated measure, submitted to the Ohio Legislature by Governor Lausche, was modeled on a Virginia statute. This Virginia statute has apparently held up under court litigation contesting its validity. But the appellate procedure was so complicated that a good many constitutional lawyers would hesitate to say that the U. S. Supreme Court would approve such utility anti-strike legislation if it could get up to the highest court in a test case which would call for a decision squarely on the merits of the law.

The Virginia statute gives the state governor authority to seize public utilities during such strike emergency and operate them as state agencies until the settlement of the labor dispute. The state of Virginia has actually used this power in a minor strike involving a common carrier, which got into the appellate courts. The Virginia court said the law was all right. Because of the way the subsequent appeal was brought to the U. S. Supreme Court, the latter did not see fit to review the matter any further. So, there is at least some question whether the Virginia statute (if copied by another state) would be sure to stand up, as Governor Lausche might have wished.

On the other hand, the Ohio house judiciary committee report—which was subsequently adopted by the full house—reached a pretty stout conclusion when it stated flatly that a law drafted along the lines of the Virginia law would contravene a U. S. Supreme Court decision, several years ago, which threw out a somewhat different type of utility anti-strike statute adopted by the Wisconsin Legislature.

The Ohio house committee report said that Lausche's proposal "would attempt to cover a field of legislation . . . pre-empted by the federal government under the National Labor Relations Act." We will see more about that, when and if the NLRB takes action on its own.

It was the conclusion of the Ohio house, moreover, that "the seizure of public utilities in labor disputes would tend to weaken the collective bargaining process to the detriment of labor relations in public utilities in Ohio." Further rebuking Governor Lausche, the legislators, including members of his own party, accepted the house committee's declaration that the governor himself has the authority under existing laws to deal with the problem. The report stated:

"It is the opinion of the committee that procedures exist under present laws, including emergency powers of the governor under the Constitution and statutes, which are adequate for maintaining law and order in the areas concerned and that if resort is had to those remedies and law enforcement is restored, telephone services can be resumed."

The governor, who retires to go to the U. S. Senate on Jan. 14, has offered to call out the National Guard, but has found little support for such action.

But Governor Lausche clung to the hope that eventually some solution will be found to the problem of strikes which tie up vital services rendered by public utilities. "Inevitably," he declared, "prudent and properly intentioned legislators will continue to give study to the problem."

J. E. Johnson Named to Post with General of SE

J. E. Johnson, general commercial manager of General Telephone Co. of the Southeast at Bluefield, W. Va., has been appointed general commercial supervisor of the southeastern group of General operating companies, according to an announcement made on Nov. 30 by H. E. Hussey, chief executive officer of General's southeastern companies.

Mr. Johnson has moved to the company's Durham headquarters, and has joined the staff of Gordon Saunders, general commercial and traffic manager. In his new position Mr. Johnson will supervise commercial activities.

Mr. Johnson began his telephone career at Lansing, Mich., in 1927, moving in succession to Grand Rapids, Hastings and Howell, Mich. In 1947 he joined General Telephone at Lafayette, Ind., where he filled increasingly important commercial assignments until his appointment in 1954 with General of the Southeast at Bluefield.

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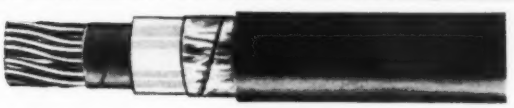

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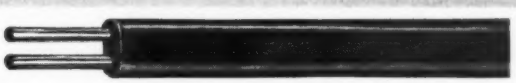

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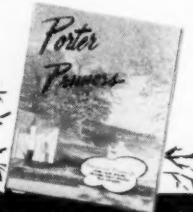

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ABC OF THE TELEPHONE

Concluded from page 31

need may arise to check or verify the depth of setting. As a general rule the pole manufacturer places an identifying brand 10 feet from the butt end of the pole. Subtracting the height of the brand above the ground line from 10 feet will give the depth of setting.

(To Be Continued)

N. C. Commission Approves Bonds-for-Stock Switch

The North Carolina Utilities Commission on Nov. 28 authorized the Central Telephone Co. to issue $75,000 in 4½ per cent subordinated debentures which will be exchanged for 15,000 shares of $2.50 cumulative preferred stock held by institutional investors (TELEPHONY, Nov. 24, p. 43).

Under the exchange, the company will pay an interest of $33,050 per year on the 20-year debentures in place of a dividend requirement of $37,500 on 15,000 shares of cumulative stock.

Northwestern Mutual Life Insurance Co. will get $625,000 worth of debentures for 12,500 shares of stock, and Modern Woodmen of America will get $125,000 worth of debentures for 2,500 shares of stock.

The stock has a stated value of $50 a share, and the debentures have a 20-year maturity.

The company said it was making the swap because (1) the $2.50 annual dividend comes out of income after federal income taxes and the interest on the debentures would come out of income before taxes and thus would give the effect of deductibility; (2) it is difficult to secure proxies from institutional investors, and (3) the dividends on the 15,000 shares of stock comes to $37,500 a year while the interest on the debentures will come to only $33,050 a year.

In granting the request, the Commission observed that the company will save approximately $21,000 a year.

Miss. Company Given Charter

The Mississippi Public Service Commission during the week of Nov. 19 issued a corporation charter to the Noxapater Telephone Co., it was reported.

Concern of Businessmen

"Ignorance is always dangerous and none more so than this ignorance about the actions, motives, and economic effects of business. Replacing it with the truth should be the concern of all businessmen."—M. J. RATHBONE, *president, Standard Oil Co. of New Jersey.*

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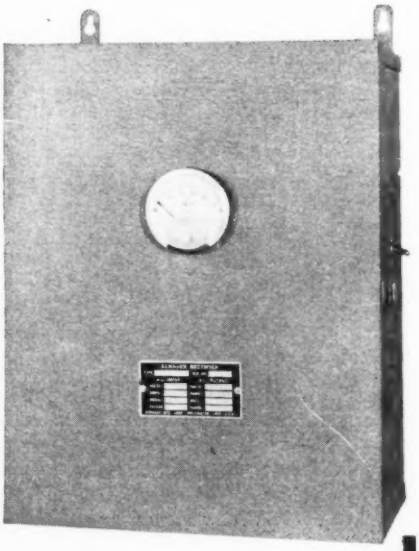

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Book Reviews

"COMMUNICATION ENGINEERING," third edition, by W. L. Everitt and G. E. Anner. 644 pages. Price, $9.00.

The authors: Mr. Everitt is Dean of the College of Engineering, University of Illinois, and Mr. Anner is associate professor of Electrical Engineering, also at Illinois.

The publisher states this standard work is noted for its clear, step-by-step analyses of the major problems confronting the communications engineer. In the third edition, emphasis is placed on the area which must precede the study of all other divisions of communication, namely, the fundamentals of linear-network analysis and synthesis, including the use of unilateral elements.

In order to demonstrate the design requirements which are imposed on the linear portions of communications systems networks, both an analysis of various types of modulation and the transformation of transients from the time of frequency domain are developed.

The publisher lists the following new third edition features:

A general discussion of the nature of signals, elementary information theory and principles of modulation, in order to establish the fundamental requirements which must be met by the linear transmission networks of a communication system.

A fundamental analysis of the specification of transmission networks in terms of steady state and transient response, Fourier Transforms, and zero-pole analysis, showing interchangeability between the time and frequency domains.

A broader treatment of mesh and nodal analysis of general networks; more general treatment of reactance networks, including methods of network synthesis.

More general treatment of long lines.

Low-loss line analysis and synthesis by means of bi-circular and Smith charts.

Use of corner plots to assist in synthesis of networks.

Broader treatment of filters and equalizers.

General use of normalization and symmetry to make analyses more universal.

Losses in impedance transforming networks.

Broadband impedance transformation systems using both lumped and distributed network elements; broadband linear amplifiers.

This book may be purchased through TELEPHONY.

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"REFERENCE DATA FOR RADIO ENGINEERS," published by the International Telephone & Telegraph Corp., Publication Department, 67 Broad St., New York 4, N. Y. Price,

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$6.00 per copy; also $4.80 per copy in lots of 12 or more to a single address. The book is 8⅝ by 5¾ inches and contains 1121 pages and a 3500-item cross index.

In this fourth edition of "Reference Data for Radio Engineers," the contents of the previous volume were brought up to date, expanded where developments required further treatment, and new material added on such important subjects as modern network design of filters, magnetic amplifiers, feedback control systems, semiconductors and transistors, scattering matrixes, digital computors, nuclear physics, information theory, and probability and statistics.

As indicated by its title, it is primarily a compilation of equations, graphs, tables, and similar data that are frequently needed in general radio engineering and in college instruction. Prepared by engineers who are specialists in the numerous subjects covered in the book, the company states it is intensely practical and compact and constitutes a convenient single source of data not previously gathered together in one volume.

The book may be ordered direct from International Telephone & Telegraph Corp.

Obituary

FLOYD L. SHELTON, 59, district manager for United Telephone Co. of Indiana, Inc., died unexpectedly in Columbia City., Ind., on Nov. 20, from a heart attack.

Mr. Shelton was a native of Shelbyville, Ind., and attended high school at Cicero, Ind., where he was a star athlete. He began his telephone career in his father's exchange in Cicero, Ind., in about 1914, working later at the Mooresville exchange. He was also associated briefly with the predecessor company of Indiana Bell Telephone Co. in Indianapolis.

His first job with United Telephone Co. of Indiana, Inc., was that of repairman and local manager at Kentland, Ind., followed by the position of local manager at Union City, Ind. During World War II he was promoted to manager of the company's LaGrange district and, later, the Knox district.

In 1946, Mr. Shelton became district manager at Warsaw, Ind., and, in 1950, he was transferred to the Columbia City district where he was manager until his death.

He is survived by his widow, Sybil, a son and daughter, and four grandchildren.

Essential Ingredient

"All free governments are party governments."—GARFIELD.

H. C. White, Jamestown, N. Y. General Auditor, Retires

Harold C. White Sr., who has been general auditor of the Jamestown (N. Y.) Telephone Corp. for 30 years, was honored upon his retirement at a dinner in Hotel Jamestown on Nov. 19 given by employes of the company.

H. C. WHITE

Al N. Seward, vice president and general manager of the Jamestown Telephone Corp., was toastmaster, and made the presentation of gifts to Mr. White, including a book of memoirs, in which his associates had written personal tributes.

Mr. White became general auditor on Mar. 15, 1926, and since that time he has held important offices in state and national telephone associations, as well as giving leadership to many organizations in Jamestown.

He was president of the former Ashville-Panama Telephone & Telegraph Corp., and is a member of the board of directors of the Jamestown Telephone Corp., Meadville (Pa.) Telephone Co., and Telephone Securities Co.

He was president of the New York State Telephone Association in 1949 and 1950, having previously served as its treasurer and vice president. He is a member and past chairman of the Accounting Committee of the United States Independent Telephone Association, and a former member of the accounting committee of the Pennsylvania Independent Telephone Association, where he gave instruction in accounting methods to Pennsylvania telephone companies on several occasions. He has presented papers on accounting and financing before the annual meetings of New York and Pennsylvania associations and the national association.

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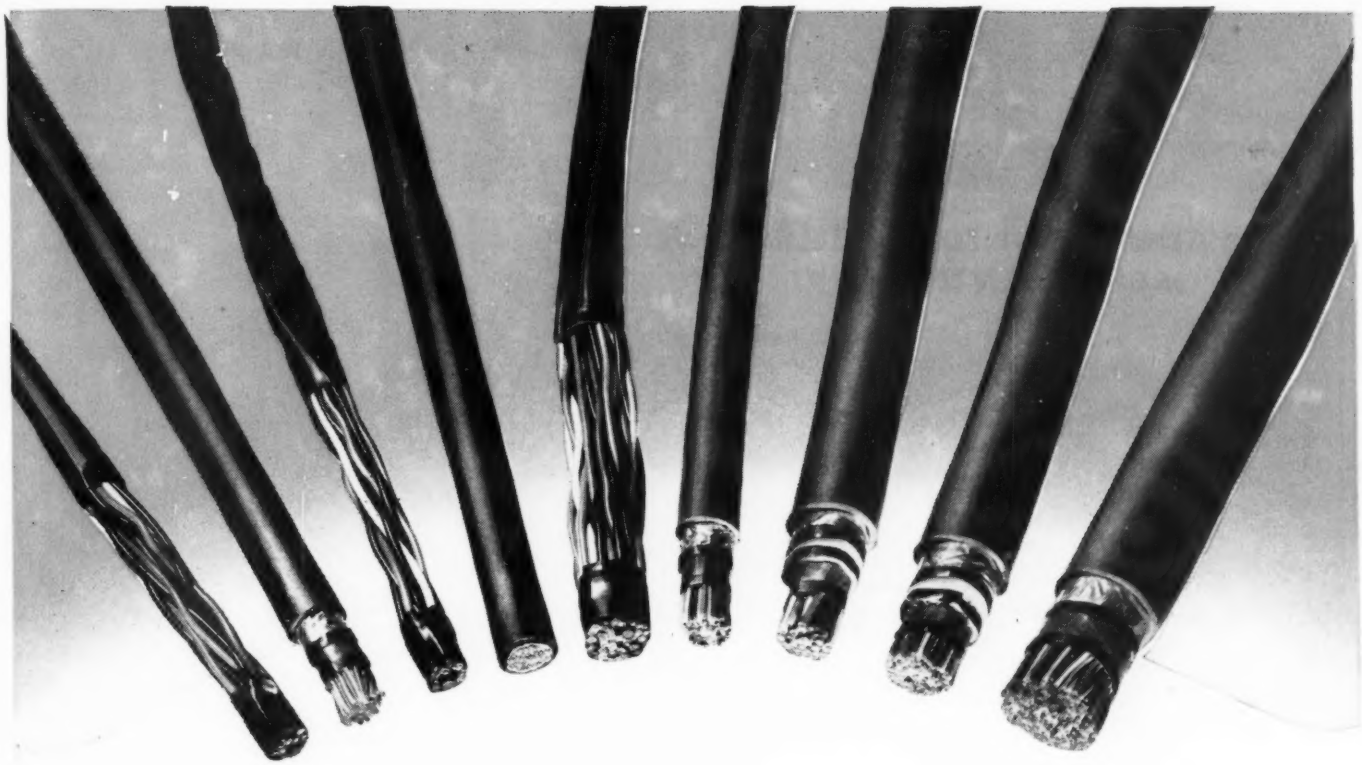

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ALATHON polyethylene resins offer low power loss and dielectric constant, toughness and flexibility even at extremely low temperatures, and high moisture resistance. ALATHON has particularly outstanding thermal and mechanical properties.

ALATHON 4, BK-20 offers exceptional outdoor durability and resistance to environmental stress cracking. It is protected from ultraviolet light by fine channel black, intimately dispersed, and has excellent low-temperature toughness, contributed by the high molecular weight of the composition.

ALATHON 5, NC-10 and ALATHON 5B, NC-10 are unpigmented and offer the best electrical properties. The low power factor and dielectric constant of these resins remain essentially unchanged over the entire range of frequencies measured to date, and over a wide range of temperatures.

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ALATHON 5, BK-21 is protected from ultraviolet light by fine channel black. It has unusually good loss characteristics for material containing carbon.

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Du Pont has prepared property and application data that will help you choose the composition of ALATHON which will work best in your specific application. To get this complete information, simply clip and mail the coupon below.

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Type D — a truly great extension ladder built in strict accordance with safety regulations. Rungs are second growth hickory, reinforced with steel rods and equipped with special automatic locks and Duo-Safety's famous Safety Shoes. Made with either straight or parallel side rails, Type D is available in one, two or three sections — in a large variety of sizes. Write for free catalog on all Duo-Safety ladders.

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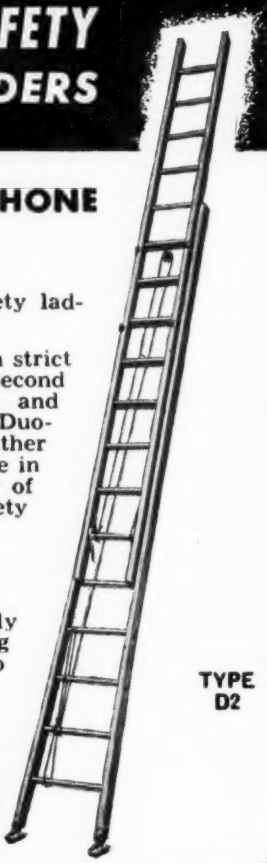
Duo-Safety ladders will be shipped immediately upon receipt of order! A planned stock-piling program assures really fast action — there's no delay the Duo-Safety way!



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Exchange equipment designed for supplying chemically dry air for telephone cables, aerial and underground, this unit can supply as many as 60 cables. Main feature is individual flow indicator for each cable showing volume of dry air consumed per cable per hour.

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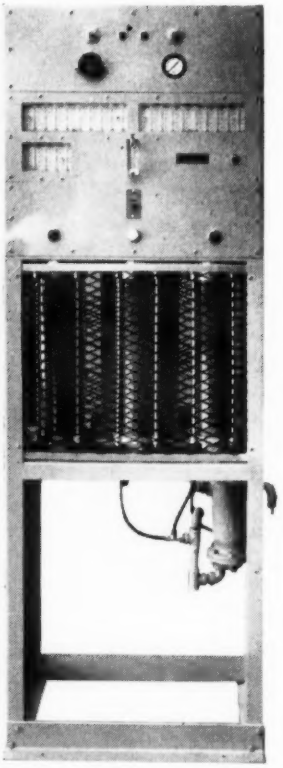

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H. A. Hubbard Named to Post With Northern Ohio

Col. Wm. C. Henry, president and general manager of Northern Ohio Telephone Co., has announced the appointment of H. A. Hubbard as assistant to the general manager, effective Nov. 19. He will be stationed in the Bellevue general offices of the company.

H. A. HUBBARD

Mr. Hubbard joins Northern Ohio Telephone Co. from The North Pittsburgh Telephone Co., Gibsonia, Penn., where he was vice president and general manager. He has a background of electrical engineering at Cornell University, service in the U.S. Army Signal Corps and with the equipment department of The New England Telephone & Telegraph Co.

Forecasts "Richer Life In a Poorer World"

We can have "a richer life in a poorer world." That is the substance of an unusual address made recently by B. Brewster Jennings, chairman of the board of the Socony Mobil Oil Co., reports the *Industrial News Review*.

At the beginning, Mr. Jennings described some of the changes that have taken place in this country since the turn of the century. Our population has more than doubled—while our use of basic raw materials has increased to a much greater extent. For instance, we use seven times as much copper, 10 times as much steel, and 75 times as much oil. We also use vast quantities of materials which didn't exist in other days, such as aluminum. So, in addition to having more people to supply, each of them must be supplied with more goods and services of a thousand kinds.

This has been accomplished, Mr. Jen-

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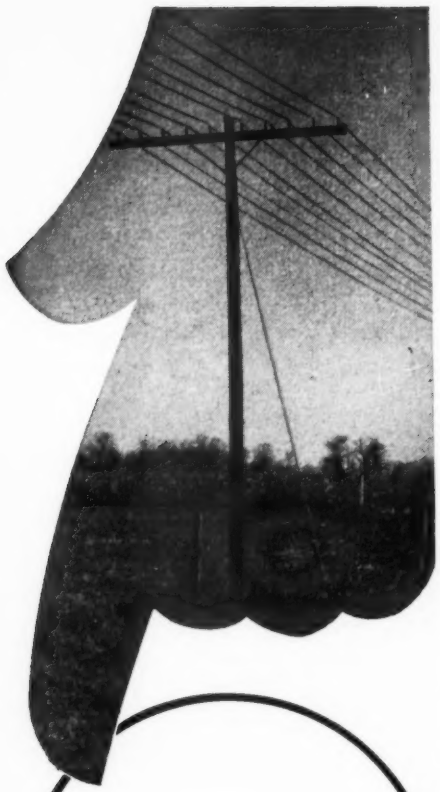

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The rugged tensile strength of *Crapo* HTL-135 and its heavy galvanized coating provide dependable and economical service life on typical rural lines.

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nings pointed out, by invention and industrial organization which made raw materials go farther and do more work than ever before—and then produced more and more from sources either poorer, or less accessible, or both. As an example of the first achievement, 38 years ago it took twice as much crude oil to produce a gallon of gasoline as it does today.

As an example of the second, half a century ago all iron ore in use was so rich it could be taken directly to the blast furnaces—at present a substantial part of the available ore is comparatively inferior in quality and must go through an extremely costly beneficiation process.

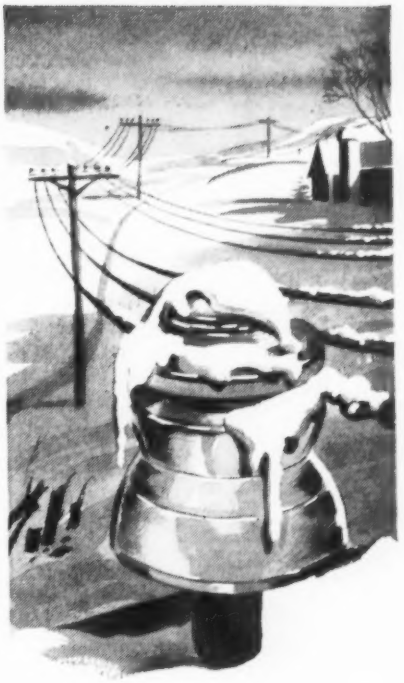
On top of that, to carry the examples on, miners must go ever deeper for rich ores—and the oil men must go ever deeper and farther away in their search for new oil supplies.

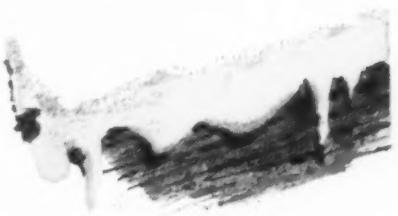
This indicates some of the problems the future will bring. World population is expected to increase by one billion by the end of this century. World living standards are expected to improve. The consequence, in Mr. Jennings' words, is "that more people living better will pose a tremendous chal-

Telephone Field Automation

"Not so long ago the big bugaboo of every working person was that dragon 'automation.' It was just a new word for a process that had been going on in industry for years, the process of substituting machine operation for manual operation. The fear was that in the not too distant future a few rich men would be sitting back watching their machines turn out goods while the masses, with no jobs and no income, would slowly starve. Nobody seemed to wonder what those machines would turn out and who would buy the products to make the few richer and richer.

"Anyhow the dragon has proved to be an angel, with the present labor supply unable to match the demand. Along this line it was interesting to note recently an item published by the telephone industry. It stated that if all the present telephone traffic had to be handled by manual operation (no automatic dialing, etc.) there would not be enough women in United States between the ages of 18 and 40 to fill the jobs!"— ***Drover's Journal.***





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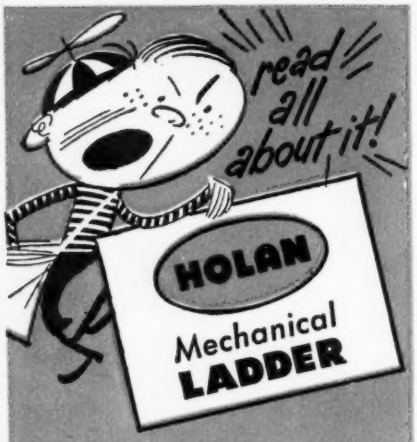

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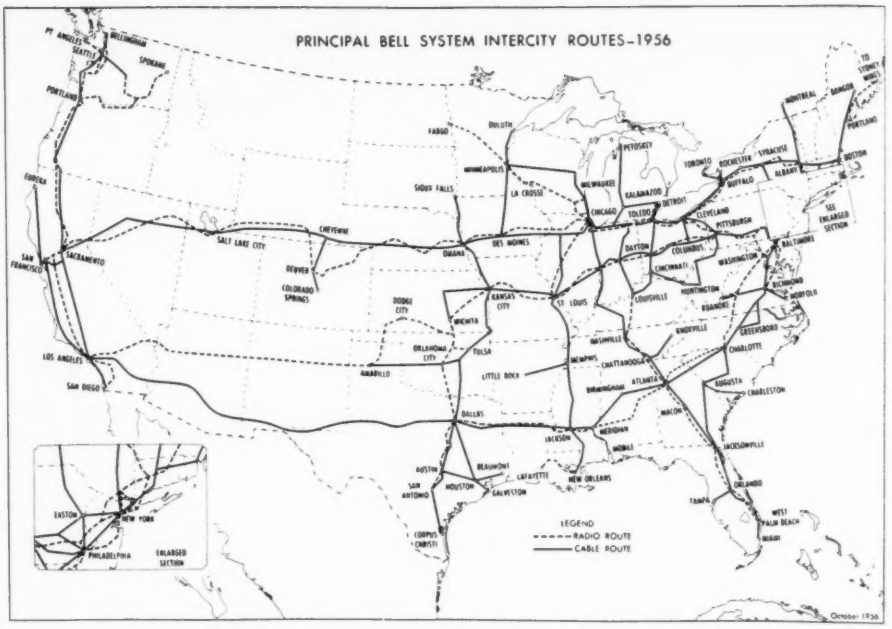

Principal Bell System toll routes throughout the nation.

lenge to the world's agriculture and industry to supply their material wants."

That challenge can be met by what he terms "man's greatest discovery—teamwork by agreement." Teamwork simply means a pooling of resources of every needed kind—whether for an assault on Mt. Everest or to release the energy within the atom.

In industry, Mr. Jennings states, there will be a ". . . need for teamwork on a larger and larger scale as capital costs increase and accumulations of capital in individual hands are pared by income and inheritance taxes. How to raise the necessary capital to meet the challenge of a more abundant life for more people from poorer resources may prove to be the most difficult of all the big problems we face in the next 44 years."

That problem can be solved, Mr. Jennings clearly believes, if the needed kind of teamwork is encouraged. But there are deterrents to it. These include inflation, and tax and legislative proposals of various kinds which would make it more difficult to get necessary capital together for the tremendous jobs that lie ahead. It would be particularly dangerous, he said in effect, if big business were made a target and treated in a punitive manner. For there are areas in which big business is absolutely essential—just as there are areas in which the smaller business can operate most effectively.

Mr. Jennings ended his talk with these words: "Mankind's way to a richer life in a poorer world is clear. I have the utmost confidence that if we can but see the light we will be guided by it."

The Army's Chief Signal Officer, Maj. Gen. J. D. O'Connell (right), was guest speaker at recent meetings of the San Francisco and Los Angeles Councils of West Coast Electronic Mfrs.' Association. The general also toured the San Carlos plant of Lenkurt Electric Co., carrier and microwave firm, accompanied by Col. S. S. Cerwin (left), Sixth Army Signal Officer, and Carl Roe, Lenkurt's commercial relations manager.

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Christmas Time

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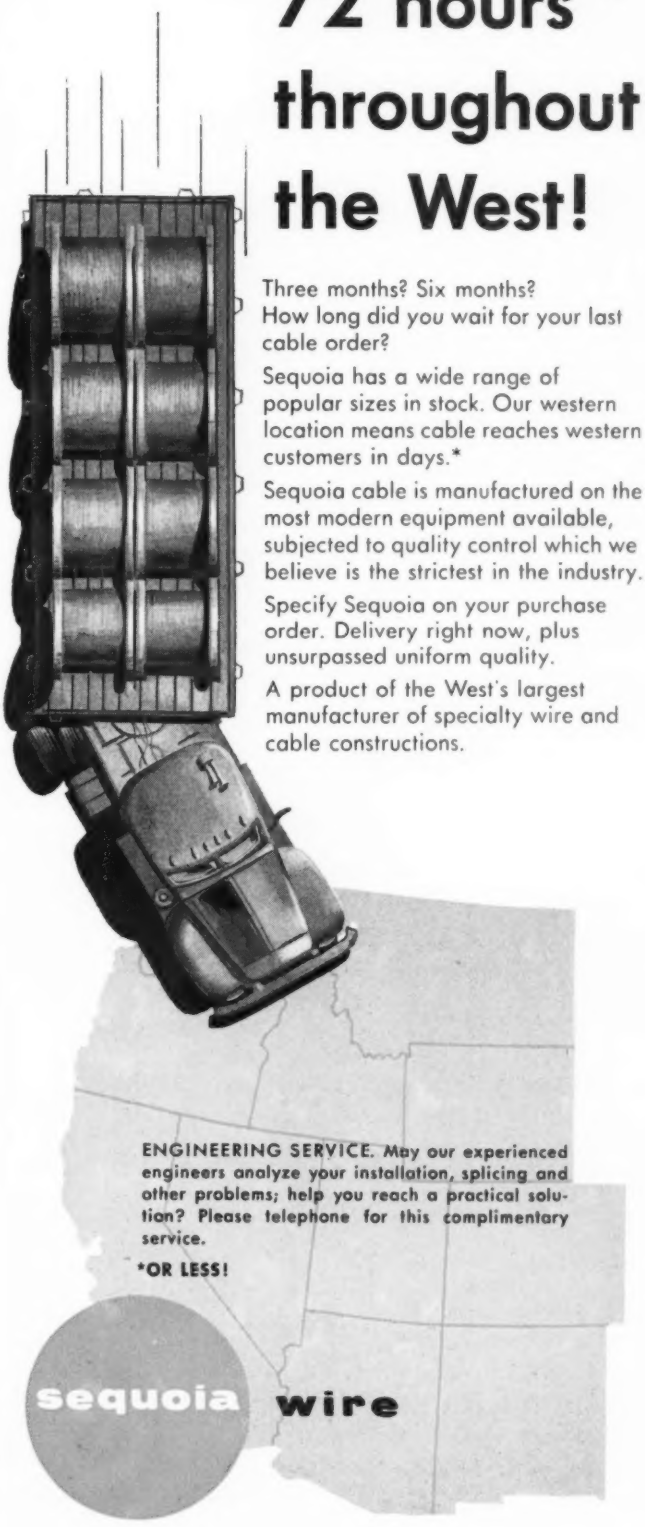

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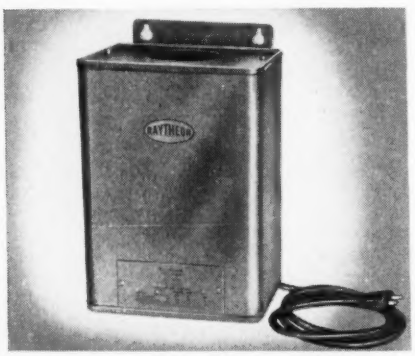
by Philip W. Blood, Office Mgr. and Inside Sales—Pacific Coast

In my 14 years with Stromberg-Carlson I've come to know the careful attention paid to supply orders like yours. When you order equipment from Stromberg-Carlson, **everybody** makes sure it's right. First, the manufacturer. He produces a long-lived product and his good name comes with it. And then Stromberg-Carlson—in delivering the product to you—gives you a guarantee backed by our 62-year reputation. So you get your money's worth for day-to-day operations—and you invest something in the future, because it's your supply business that plays a major part in helping us continue our research for new and better telephone equipment. It's business we certainly appreciate—thanks a million for your continued support!

How to get humless DC *and* 20-cycle ringing in one unit

In a case that's just barely big enough to carry a husky lineman's lunch, you can get plenty of power.



Both battery eliminator and 20-cycle ringer are combined in one small unit, providing 1 ampere, 24 volts.

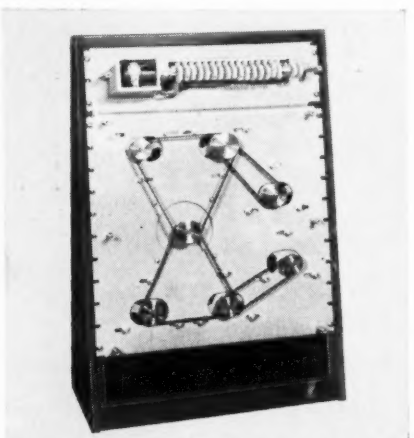
We're talking about the Raytheon RectiRingeR, which measures only 7⅜" x 12¾" x 6". Here, in one compact little unit, you get **both** a battery eliminator and 20-cycle ringer.

This unit includes the RectiFilteR, the DC power source that has been proven by years of service for Independent telephone companies. It supplies humless, regulated DC power, with 20-cycle ringing power.

Ringing panel uses only 360 watts

The full-load power consumption of the AC Ringing Panel shown here is only 360 watts, regardless of output frequencies.

This low power consumption allows the machine to operate continuously without excessive operating costs.



New ringing panel — either AC or DC driven.

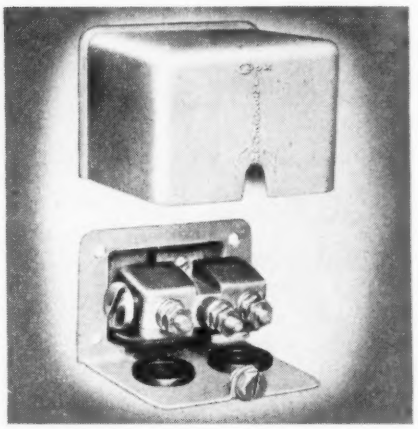
The new Holtzer-Cabot 25 Watt Multi-Frequency Ringing Panel is available either AC or DC driven for all the standard frequencies—harmonic, synchromonic, or decimonic.

Since the generated frequencies of the primary and standby machines have identical wave-shapes, ringers adjusted to the primary unit will ring equally as well on the standby unit.

The new Cook "Interceptor"

Lower Maintenance Costs—Sounds good, and it is! It's the new "Interceptor," a fuseless sub-station protector made by Cook Electric Company.

The "Interceptor" contains a Bakelite unit having heavy Everdur bussed circuits and ground studs, insert-moulded. It is compact and employs the protection characteristics of the Mini-Gap carbon-to-carbon arrester. There are two

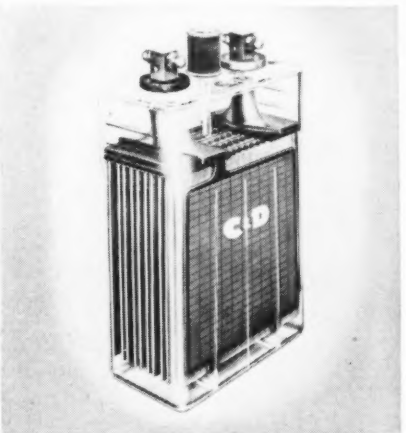


"Interceptor" fuseless sub-station protector

Mini-Gaps used and they will pass, simultaneously, a current of 30 amperes for 15 minutes without destruction in accordance with Underwriters' requirements.

These two battery types give you decades of good service

Here's a dependable power supply for you with a life expectancy of **25 years!** It's the C & D Plasti-



This low-cost PlastiCell battery has life expectancy of 14 years. Its PlastiCal counterpart will last you 25 years.

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Cal telephone battery, and when we say it will last 25 years, we're thinking about **full float service.**

You get this extra-long life because C & D PlastiCal (lead-calcium grids) batteries have an exclusive suspended and supported plate construction.

If a 14-year life expectancy will fill your needs, C & D has an economical battery for that, too. It's the PlastiCell battery, using high-tensile lead alloy grids.

In the picture, you see one of these PlastiCell batteries. It's the CE-11 and has a 300 A.H. capacity. In PlastiCal, specify PCE-300.

Direct burial cables save cost of underground ducts

Ansonia manufactures cables for direct, ductless burial, thoroughly armored to provide the mechanical protection you need for dependable telephone service.

Ankoseal Type 775-AP Direct Burial Cables offer you the added protection of two .013" aluminum alloy flat armor tapes, plus an overall jacket of Ankoseal plasticized PVC over the standard Type 775-P

Layers of protection make Ankoseal Direct Burial Cable ideal for low-cost underground placement of outside cable plant.

Cable. The armor tapes give additional shielding.

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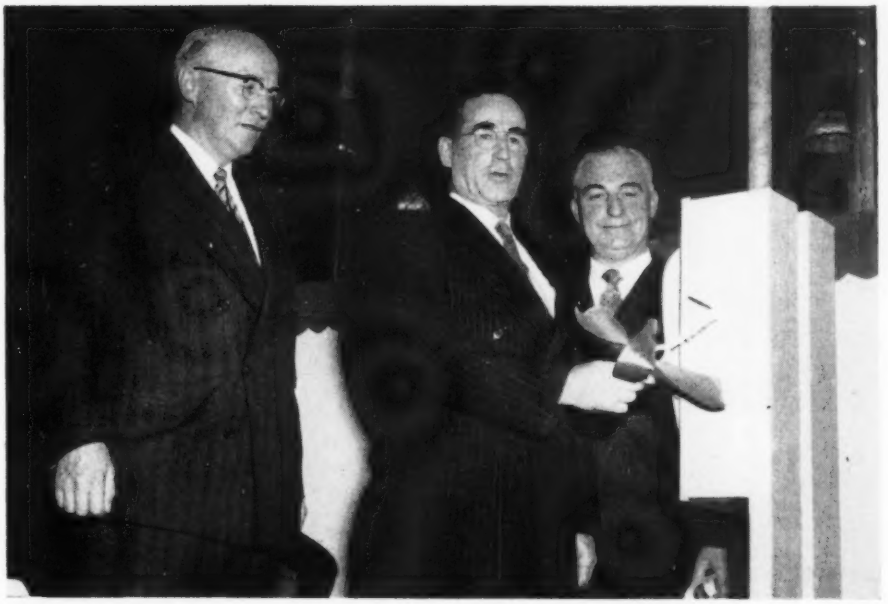
Sales Offices: Atlanta 6, Chicago 6, Kansas City 8, Rochester 3, San Francisco



Manitoba Premier Douglas Campbell pushes the electrical switch that sets wire and cable machinery into motion in the first western Canada telephone cable plant, and in the area's largest wire plant—the adjoining plants of Telecables & Wires Ltd. and Canada Wire & Cable Co. Ltd. Watching the switch are O. W. Titus, left, vice president and general manager of Canada Wire and president of Telecables, and J. R. MacDonald, president, General Cable Corp. and vice president of Telecables.

Open Western Canada Wire and Cable Plant

Western Canada's first telephone cable plant and the area's largest wire and cable factory were simultaneously opened officially in Fort Garry, Man., recently by Manitoba's Premier, Douglas L. Campbell.

Under the 92,000-square-foot roof there are two separate plants. Both, however, are controlled by Canada Wire & Cable Co. Ltd.

Telecables & Wires Ltd. is a new company, formed through a partnership between Canadian, British, and U. S. cable makers. Canada Wire & Cable Co. Ltd., has the majority share interest, and minority holdings are owned by the General Cable Corp. of the United States and the Telegraph Construction & Maintenance Co. Ltd. of London, England.

The Telecables production range includes paper-insulated, lead-covered telephone cable and polyethylene-insulated exchange cable.

The Canada Wire section of the plant is the latest step in an eight-year 9-million-dollar expansion, modernization, and decentralization program. This plant will draw copper and aluminum rods into wires and, when desired, insulate them with plastics. Its products will be part of the normal Canada Wire line: bare copper wire, plastic insulated building wires, line wires, and triplex. One of the factory's most important functions will be to supply soft copper wires to Telecables.

The new wire and cable production center is on a fully road-rail served 13.5-acre site. Production area totals 82,000 square feet, of which 42,000 square feet is used by Telecables & Wires Ltd. and 40,000 sq. ft. is for Canada Wire & Cable Co. Ltd. The balance is used for receiving, shipping and service facilities and for office space.

The building has been designed for expansion 350 feet north or south. Design of the existing building, however, allows for a doubling of production capacity through the addition of extra machinery.

When full one-shift production is reached, the plants will employ about 75-100 persons. By opening day, some 60 persons were on the job.

Plant manager is H. B. Carnahan. H. O. Coish is manager for sales and engineering for Telecables and G. F. Smith is sales manager for Manitoba for both Canada Wire and Telecables.

Understanding Our Economy

"Certainly there is no reason for any businessman to feel that the job of better public understanding is accomplished just because business is a popular subject these days. Familiarity is no substitute for understanding. And real understanding is worth working for, since the future of our industrial economy is at stake and, along with it, the future of every American."—M. J. RATHBONE, *president, Standard Oil Co. of New Jersey.*

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"He says he might as well blow it up as try to change it."

"He should'a bought Strowger Automatic. It adapts EASILY to changing needs!"

WHY GAMBLE?

strowger automatic **assures** success

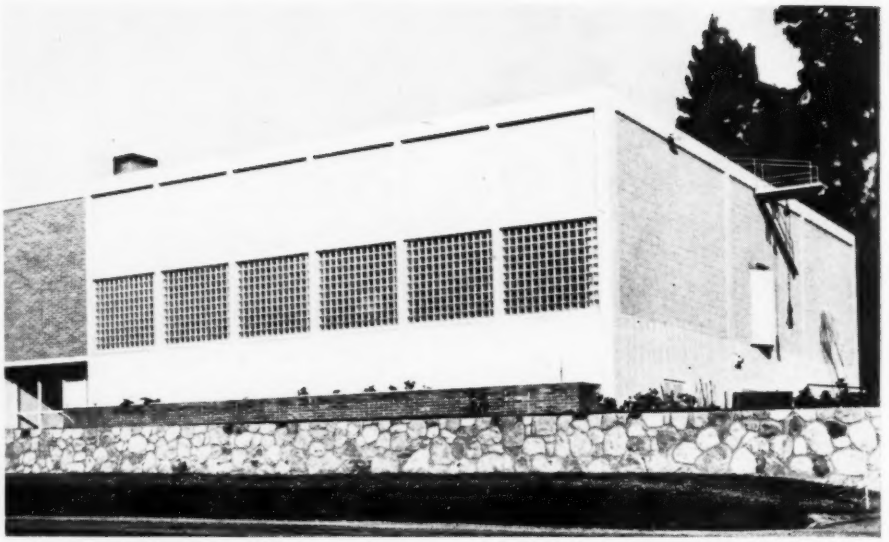
For over 60 years, Strowger Automatic has adapted easily and economically to new requirements. It has met every one with notable success. Its flexibility protects your investment, helps assure *your* success. Get the facts today.

Write: *Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.*

AUTOMATIC ELECTRIC

ORIGINATORS OF THE DIAL TELEPHONE

GENERAL SYSTEM INDEPENDENT



The new $100,000 building of the West Vancouver exchange, British Columbia Telephone Co., constructed to house its new 2-million-dollar automatic telephone system. Building was designed to harmonize with residential surroundings.

West Vancouver Automatic Exchange Installed

Rapid growth and expansion of telephone service in western Canada reached another high mark recently when a new 2-million-dollar automatic telephone system was cut into service by the West Vancouver exchange of the British Columbia Telephone Co.

Over 6500 telephones were involved in the company's second major conversion to automatic on the lower mainland of British Columbia in 1956. Approximately 21,000 telephones were converted to dial operation in one cut-over at New Westminster in January of this year.

A new $100,000 exchange building designed and landscaped to harmonize with its residential surrounding, was dedicated at West Vancouver at the time of the conversion. Automatic equipment, consisting of 3900 lines and 7000 connector terminals of Strowger equipment, was manufactured by Automatic Electric (Canada) Ltd., and installed by Canadian (B. C.) Telephones & Supplies, Ltd.

Ultimately, long distance calls from the Vancouver area to any part of Canada and the United States will be dialed by subscribers without the aid of operators, the company announced. At present, operator service for long distance and assistance calls for West Vancouver subscribers is now provided from the main Vancouver exchange.

At the time of the West Vancouver cut-over, more than 8000 telephones served by the West Vancouver and Whytecliff exchanges were included in a 200,000-telephone free-dialing area. This free-dialing area now includes subscribers in Vancouver, North Vancouver, West Vancouver, Whytecliff and Deep Cove.

A special feature of the conversion was the introduction of interlisted numbers in the telephone directories of North Vancouver and West Vancouver. To aid subscribers in locating business and residential addresses, the letters NV and WV are added to each address to indicate North or West Vancouver locations.

Another feature was the introduction of harmonic or selective party line ringing, and the regrading of party lines so that no more than four parties will be served by a party line.

In addition to the business office in the new exchange building, four additional collection agencies, usually a drugstore, have been established at convenient locations in West Vancouver for payment of accounts.

In 10 years, West Vancouver telephones have increased by 150 per cent. The first telephone exchange was opened in 1914 with 35 subscribers, although a telephone link from nearby Capilano Dam and Vancouver had been established as early as 1890.

By 1922, a number of submarine cables had been laid to North Vancouver. A 100-circuit submarine cable in 1928 gave West Vancouver its first direct contact with Vancouver.

Ten years later, in 1939, the exchange served only 1800 telephones. After the war, demand for telephone service began to grow rapidly. The number of subscribers increased from 1800 to 8000, and the number of calls from an average of 3000 daily to more than 35,000 calls each day at the present time.

General headquarters of the British Columbia Telephone Co. are at Vancouver. The company and its operating affiliates operate approximately 125

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exchanges in the province serving approximately 400,000 subscribers, linked by over one million miles of telephone wires and radio circuits.

Cook Electric Appoints B. F. Hanway to Fla. Post

B. Franklin Hanway has been appointed to the new position of Florida district manager for Cook Electric Co., it was announced on Nov. 29 by Walter C. Hasselhorn, president.

Mr. Hanway will be in charge of the company's new Florida district sales office, to be located at 900 NE 12th St., North Miami. The new office will be opened on Dec. 10 to serve customers of Cook Electric's family of subsidiaries in Florida and the Caribbean area, including U. S. Defense Department installations.

A member of the Society of Automotive Engineers and the American Ordnance Association, Mr. Hanway was formerly sales engineer in charge of the Baltimore office of The Revere Corp. of America.

From 1951 to 1955, he was a field engineer for Aero Engineering Co., division of Garrett Corp., and earlier had been assistant planning and scheduling engineer for Piasecki Helicopter Corp. Before joining the helicopter company in 1950, he served as a design engineer with Glenn L. Martin Co. for 10 years.

Cook Electric Co. divisions and subsidiaries include Cook Research Laboratories, Inland Testing Laboratories, Electronic Systems; Diaphlex, Magni-Lastic and Wirecom manufacturing divisions; The Nucledyne Corp., Chicago, and Airmod Corp., Vandalia, O.

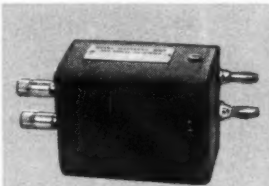
"I guess this washes you up around here, Speedy!"

Direct, accurate measurements of signal components—15 to 500 kc

Model 121 Wave Analyzer

This new Sierra Wave Analyzer is designed to give you maximum operating ease, high accuracy and broad applicability in analyzing complex wave forms between 15 and 500 kc. The instrument is particularly useful for carrier system frequency analysis and induction studies, for determining filter transmission characteristics, or for measuring distortion and intermodulation components of rf signal sources and transmitters.

The Model 121 makes possible direct measurement of signal components throughout its range, and eliminates complex expensive setups with conventional receivers and signal generators. Input level range is + 42 to − 70 dbm at 600 ohms impedance. Measuring accuracy is ± 2 db; selectivity is such that response is 45 db down at 1 kc off resonance. Input bridging impedance is 10,000 ohms in the pass band.



Model 122 LINE-BRIDGING TRANSFORMER

The Sierra 122 Line-Bridging Transformer instantly converts Model 121 Wave Analyzer from single-ended to balanced input. The transformer is a broad band ferrite core unit operating flat within 0.5 db. from 15 to 500 kc. It is compensated so that Analyzer readings are corrected for the transformer's small insertion loss. Offered in three impedances: Model 122A, 135 ohms; 122B, 500 ohms; 122C, 600 ohms.

For complete information see your local Sierra sales representative or request Bulletin 103A

sierra

Sierra Electronic Corporation
San Carlos 2, California, U. S. A.
Sales representatives in major cities

Manufacturers of Carrier Frequency Voltmeters, Wave Analyzers, Line Fault Analyzers, Directional Couplers, Wide-Band RF Transformers, Custom Radio Transmitters.

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CLASSIFIED SECTION

Rates 15 cents per word payable in advance. Minimum charge $3.00 for 20 words or less. Classified advertisements must reach us 8 days before publication date.

HELP WANTED

WANTED: Telephone Installers, Cable Splicers, Linemen, Central Office Installers. Yates Construction Company, 1507 South 6th St., Paducah, Kentucky. Telephone 2-4623.

CABLE SPLICERS, Station Installers, Equipment Installers, Linemen. Experienced men needed. Steady work, good pay. Henkels & McCoy, 1211 Kenmore Avenue, Elkhart, Indiana, or 6100 N. 20th St., Philadelphia, Pa.

PLANT ENGINEERS for large Independent Telephone Company. Some experience necessary. In reply state age, educational and employment history. Address reply to Personnel Supervisor, Rochester Telephone Corporation, 10 Franklin Street, Rochester 4, N. Y.

R.E.A. TELEPHONE SYSTEM in Southeastern South Dakota needs central dial office equipment man. Company has eight Leich dial exchanges in operation, two additional Leich switchboards being installed and two 600 line Stromberg-Carlson switchboards to be installed in 1957. Experience in Lenkurt carriers and outside plant preferable, but not necessary. Company offers group life and hospitalization program, paid vacations and sick leave. Top salary for right man. Please state experience, references, age, wages expected and marital status on first application. Write Box No. 3903, c/o TELEPHONY.

HELP WANTED

CHIEF OPERATOR for one exchange company, North Central Indiana. Must be qualified and have best of recommendations. Personal interview at exchange location necessary. Write Box No. 3906, c/o TELEPHONY.

C. O. E. SWITCHMAN. Prefer experience with Kellogg X-Bar. Steady work, good pay. Submit qualifications to Southern Nevada Telephone Co., Las Vegas, Nev., P.O. Box 1190—attention E. Van Wie, Wire Chief.

MANAGER WANTED FOR 800 TELEPHONE SEVEN DIAL EXCHANGE REA financed system. Applicant should have basic plant and dial knowledge and be able to manage office using REA accounting system and practices. In first letter give age, references, and wages expected. Detail your duties in last two places employed. Address Riley Childers, Galata, Mont.

GENERAL MANAGER for a locally owned telephone company located 150 miles from Chicago—3600 stations and new dial equipment. Would serve as assistant manager until qualified to take charge. This is more than a job for the right man with basic experience as he will be in complete charge of plant and 40 employees. Opportunity to acquire stock in future. State age, education and employment history. All replies confidential. Write Box No. 3905, c/o TELEPHONY.

HELP WANTED

COMMERCIAL MANAGER wanted for progressive class A California Independent telephone company. Requires experience in both commercial and traffic departments. Excellent opportunity for young man not using all of his ability in present position. Send complete résumé first letter. All replies will be held confidential. Write Box No. 3904, c/o TELEPHONY.

INSTALLER - MAINTENANCE MAN for newly organized REA financed telephone cooperative. Excellent working conditions. Starting wage dependent upon experience and ability. Submit age, experience record and references. Excellent opportunity for experienced young man desiring permanent position in Independent telephone industry. Address reply to West Wisconsin Telephone Co-op., Box 142, Menomonie, Wis.

PLANT MAN — experienced in laying out telephone plant in the field. Familiar with cable distribution design and loading. Capable of assuming a position as a Field Engineer with ability to learn and progress in an Engineering Department. Progressive Class A Company, located in Northeastern United States. Write giving full particulars. Box Number 3910, c/o TELEPHONY.

PLANT MANAGER. Over 20,000 stations in southeast. Reply stating qualifications, age, experience and references. Salary open. All replies confidential. Present employer will not be contacted without applicant's permission. Our present employees know of this advertisement. We will pay expense of any interviews. Permanent job with ample opportunity for advancement. Submit complete résumé to Box No. 3908, c/o TELEPHONY.

POSITION WANTED

MANAGER DESIRES TO RELOCATE with company having a group of exchanges or large exchange wanting man qualified to engineer dial conversion. Can take complete charge. Midwest preferred. Write Box No. 3909, c/o TELEPHONY.

WANTED TO BUY

TELEPHONES—all types—any condition. Write stating quantities and types. Our truck will pick up within 300 mile radius of Scranton, Penna. Write Box No. 3765, c/o TELEPHONY.

SWITCHBOARDS

WESTERN ELECTRIC

No. 506-B Cordless PBX Switchboards. 5 trunks, 12 stations with 5 connecting circuits. These are New.

KELLOGG

K-100 Masterbuilt Common Battery PBX Switchboard. 100 C.B. Lines with line relays. 15 cord circuits. 10 manual or dial trunks. Reconditioned.

FEDERAL

No. 25-C Dial PABX with 5 trunks, 25 lines and 3 links. Complete with Attendant's Key Cabinet and battery eliminator. These are in excellent condition.

BUCKEYE TELEPHONE & SUPPLY CO.

1250 KINNEAR ROAD HUdson 8-0655 COLUMBUS 21, OHIO

WANTED TO BUY

USED CAX DIAL SWITCHBOARDS, TELEPHONES AND MISCELLANEOUS CDO EQUIPMENT

TELEPHONE EQUIPMENT, INC.
MONTROSE, MICHIGAN
TELEPHONE 2211

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FOR SALE

WESTERN ELECTRIC NO. 392 LOUD BELLS. Refinished and tested, with condenser — $6.00 each. Write Telephone Equipment, Inc., Montrose, Mich.

ONE RECORDAK AND ONE READER at reduced price because of sale of exchange; each used for three years. Available any time. Waskom Telephone Co., Waskom, Tex.

NEOPRENE DROP WIRE, Copperweld, short lengths, none less than 90 feet. Put up on small coils - $11.00 per M ft. TELEPHONE REPEATER, TC-29-A. Consists of EE-99-A repeater, EE-8-A telephone set, No. PE-204 power supply. Less batteries, new, $40.00 per set. Quotations are FOB Chicago, Ill. Write Independent Telephone Repair Co., 2137 West 21st St., Chicago 8, Ill. Tel.: LAfayette 3-5439.

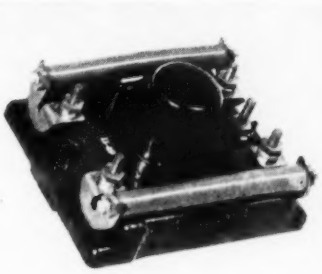
THREE SECTIONS Stromberg-Carlson, full multiple switchboard. Consisting of three toll positions: one Universal Super Service Position, four Super Service local Positions, one Hospital Position, 1100 local lines, 75 rural Common Battery farm lines, 20 P. O. lines, 30 Toll lines. Holtzer-Cabot Rotary Harmonic Ringing Converter with interrupter. Testboard, C. O. Desk, and other associated equipment now available. Write Bellamy Telephone Co., Knoxville, Ia.

DIAL BOARD for immediate service. North CX100 equipped 100 lines, 8 links, 4 CX trunks in 2 groups, code ringing, Cook 100 Wall M.D.F., batteries (3 years old), and charger. Housed in a 10' x 14' insulated wood frame building with asbestos shingle siding. Complete unit can be easily moved (on low-bed trailer) and by connecting AC power and distributing cables is ready for service. Priced at $6500 F.O.B. Medina, N. D. Marshall County Telephone Co., 530 Syndicate Bldg., Minneapolis 2, Minn.

NORTH ELECTRIC CX-100 SWITCHBOARD, 2-5 numbering, seven years old, fully equipped, three extra links. Available June 1, 1957. Price $8,500, F.O.B. Chancellor, Va. For details call Sterling 6-2681 or write F & W Telephone Co., Chancellor, Va.

PAPER-LEAD TELEPHONE CABLES. 3000 feet 51 pairs, 1500 feet 202 pairs. All 22 gauge. Available in Charleston, S. C., for immediate shipment. Made to American specifications by largest West German cable manufacturer supplying many American Independents. Telephone or write: Columbia Technical Corporation, 61-02 31st Avenue, Woodside 77, N. Y. Telephone: AStoria 8-7401.

NEOPRENE JACKETED TELEPHONE CABLE
19AWG/5 Pair, Solid
1000 Ft. Reels
$60.00 M FOB
WILLIAM CERESKE COMPANY
468 Second Street
Oakland 7, California



RECONDITIONED
WESTERN ELECTRIC #98A

Station protectors, complete with two No. 11C fuses, Two No. 2G and Two No. 27 protector blocks

Price.....$ .75 each
Lots of 100.....$ .70 each
Lots of 500.....$ .65 each

RECONDITIONED
FEDERAL #804A

Magneto Compact set convertible to desk or wall. Equipped with capsule type transmitter and receiver. Can be used on long rural lines.

Shipped complete with terminal block and refinished battery box.

PRICE $18.50 EACH
12 or more—$18.00
Terms 2%—10 Days Net: 30

BOHNSACK EQUIPMENT CO.
GERMANTOWN, NEW YORK

W.E. F-1 trans. capsules—factory rebuilt.... .75
W.E. HA-1 receiver capsules, like new, perfect ..... .50
W.E. #5H Dials, $4.00 ea., lots of 25 to 49—$3.50 ea., 50 to 100—$3.00 ea. Rebuilt.
W.E. #6A Dials—$5.00 ea. 4H..... $2.00 ea.
REBELCO handset conversion kits. F-1 handle, cover plate, 4 cond. cord and saddle....$7.50
W.E. E-1 handles with F-1 unit and 3 cond. cord $2.50
W.E. F-1 handles—F-1 and HA-1 units, with cord $5.00

Handset transmitters expertly rebuilt using factory methods at reasonable rates.

Over forty years of service to the Independent industry.

REBUILT ELECTRIC EQUIPMENT CO.
1704 West 21st Place Chicago, Ill.

FOR SALE
Immediate Delivery

DIVERTER POLE MOTOR GENERATOR SET made by Electric Products CO., Cleveland, Ohio. 3 H.P.—220 Volt, 14 Amp. single phase 60 cycle Motor connected to 1¼ KW—56 Volt 25 Amp. shuntwound inherent constant Voltage D.C. Generator. @ $250.00

MOTOR GENERATOR SET—Central Electric Co. Type RS—2 H.P. 60 cycle, 110 or 220 Volt—22 or 11 Ampere Motor connected to Holtzer-Cabot (Made for A.E.Co.) 55 Volt 1 KW, 15 Amp. Generator. @ $200.00

ELECTRIC STORAGE BATTERY — Exide Tytex 23 cells, 240 Amp. hour. Less than two years in service. Fully charged and A-1 condition, with steel doubledecked Battery Rack. @ $460.00

TELEPHONE REPAIR & SUPPLY COMPANY
1760 W. Lunt Avenue
Chicago 25, Ill.
Phone—ROgers Park 4-3817

RECONDITIONED EQUIPMENT

Leich #901—2500 Ohm.	@ $21.45
Leich #605—with A.E. Dials	@@ $17.00
Western Electric #302 EW.	@ $14.00
W. E. #302 BW. W/5-H. Dial	@ $17.50
Leich #90A. W/ A.E. Dial	@ $10.00
Kellogg #1000 BC.	@ $14.00
NEW—A.E. Operators Transmitters, W/ Mouthpiece, & Neck Band	@ $ 3.00

Prices—F.O.B. Chicago, Ill.

Independent Telephone Repair Co.
2137 W. 21st St. Chicago 8, Ill.

THE "WARREN"
No. D-20 DIAL TEST SET

Tough Plastic • Standard Parts
HALF THE PRICE

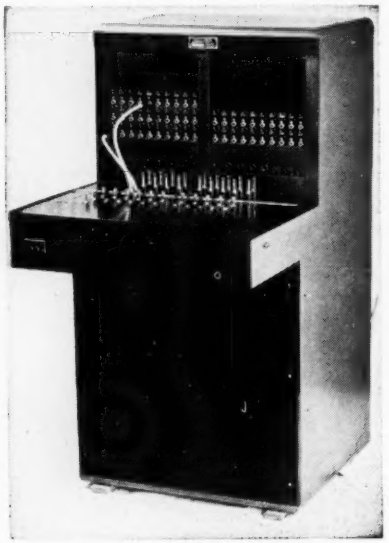
Here is a manual or dial test set that has everything. PRICE — ENCONOMY — MAINTENANCE. It is electrically simple. Will take very rough handling and is estimated to be 85% non-breakable. No shocks for the boys on those damp days. Standard replacement parts. Price about half of the other units on the market. Weight only 1 lb. 12 ozs. Four foot weatherproof nylon neoprene cord with powerful brass test clips. Fully field tested with identical type operations as units in service today. The Manual No. B-20 set users can convert by replacing dial blank with any type standard dial.

PRICE—Type No. B-20 Manual test set, blank for dial.....$21.50
Type No. D-20 dial test set.$24.50

BOHNSACK EQUIPMENT CO.
GERMANTOWN, N. Y.

MAGNETO SWITCHBOARDS

WHY put up with a WORN-OUT switchboard? when you can buy a BRAND NEW one at 1/3 price?



Kellogg (actual photo)

Kellogg & Stromberg Carlson

←*(photo to left)*

New 100 line—50 equipped with combined drops & jacks, wired to 15' 51 pr. braid cable stub—Night alarm ckt. (no code alarm) 10 cord circuits (single supervised) with repeating coils. Standard-low type, 30" cordshelf (desk height) built for Navy—never used—Hardwood (birch or maple) cabinet, painted green.

Clean as a whistle—tested—
fully guaranteed $395
(as above, but slightly used, reconditioned $295)
additional line drops (per ten) $30
—circuit prints on request—
Terms if desired

Kellogg 180 lines capacity 15 cord circuits—single sup. wired & equipped with 100 line drops & jacks, rebuilt like new. Red mahogany cabinet—low type ..... $500.
additional lines, per ten ..... 30.

Western Electric #1240 type 165 line capacity—equipped as desired with new drops & jacks, cords & plugs—15 cord circuits (single supervised).

DROPS & JACKS

W.E. #22C new $2.00
—unused, discolored 1.00
5 #22C on 89B mtg. new 10.00
#1800 swbd. 10 drop & jack (#22C) section, new 20.00
—unused, discolored, tested .. 10.00
Stromberg-Carlson #11A Drops & Jacks on 140 mtg. (5 per strip) 15.00

Plugs, W.E. #47, new ..... $ .50
#347, new ..... .75

Cords, red, white, green ..... .50

Repeating Coils

W.E. 27A, non-ring thru 3.00
25A, non-ring thru 5.00
70A, ring-thru, large 5.00
76A, ring-thru, double 5.00
77A, ring-thru 3.00
91A, ring-thru, double 10.00
93A, ring-thru, double 10.00
94E, F, G, S, non-ring-thru .. 2.00
120 types 3.00
Kellogg #19A, B, #20A 3.00
(many others, all mfg.)

PLAN TO CONVERT
Magneto to Dial

Start now by using CB phones in town —one of these coils connected to each drop, thru condenser to common battery will provide CB service on that line.

Subscriber signals operator by lifting handset and rings off by restoring it.

—KICK-COILS—

KELLOGG

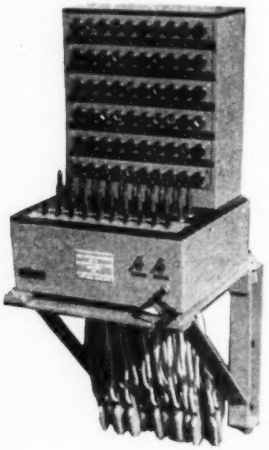
C-111

Brand New, ea. .. $3.00
Lots of ten, ea. .. 2.75
Lots of fifty, ea. .. 2.50
Lots of 100, ea. .. 2.00
Mounting Strip—(10 coil) 19" rack 2.50
Used coils, A-1 .. 2.00
Condensers, 2 M.F. ..... .75

Batteries, storage, Gould 14 volt dry charge—add electrolite .. 10.00
(use one, or two if lines are long)

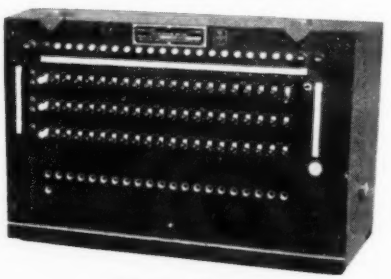
Telectric Co.
1218 VENICE BOULEVARD
LOS ANGELES 6, CALIF.
Richmond 8-2249

ELECTRONIC MAGNETO TYPE
(No Drops or Relays)



50 line (magneto) Lamp Neon operates directly from 115 volt AC power, thru Selinium rectifier, 18½" high, 11½" wide, light weight. Excellent as PBX to Mag. exchange, with LB or CB Phones (with kick coil). Complete with mtg. bracket, power supply, W.E. handset & spares, U.S. Navy ..... $150.

CORDLESS LAMP



BD 95—Kellogg

Ideal for PBX from Mag. CO

BD 95 (Signal Corps) mfg. by Kellogg 24 volt DC, 5 connecting circuits, line relays—Designed for use with mag. sub-sets, but also may be used with CB phones with kick-coils. 22" long, 14" high, 13" deep. Black phenolic face, sheet metal cover.

BD 95, 20 line new, A-1 ..... $150.

BD 105, 12 line (same size) new, A-1 ..... 100.

BD 116 (W.E. #506B Special) 24 volt 12 CB Lines, 2 CB trunks, 3 LB lines or trunks, 5 connecting circuits. Same size and appearance as standard 506B.
new, A-1 ..... $195.
slightly used ..... 125.

W.E. 506 standard cordless swbds. 7 CB lines, 3 CB trunks, 5 conn. ckts. good used, reconditioned .... $150.

W.E. 506B, 12 CB lines, 5 CB trunks ..... 195.

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Of poles, crossarms, and preservative treatments. Analyses of wood preservatives. Consulting and specification writing. Inspectors stationed throughout U.S.A.
A. W. WILLIAMS INSPECTION CO., INC.
MOBILE, ALABAMA
ESTABLISHED 1921—MEMBER A.C.I.L.

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Consulting Engineers
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Consulting Engineers
209 West 6th Street
TOPEKA, KANSAS
Telephone 2-2358

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STATION INSTALLERS
STEADY WORK, GOOD PAY
MIDWEST LOCATION.
The Weikel Line Company, Inc.
FORT WAYNE, IND.

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PUBLIC UTILITY CONSTRUCTION
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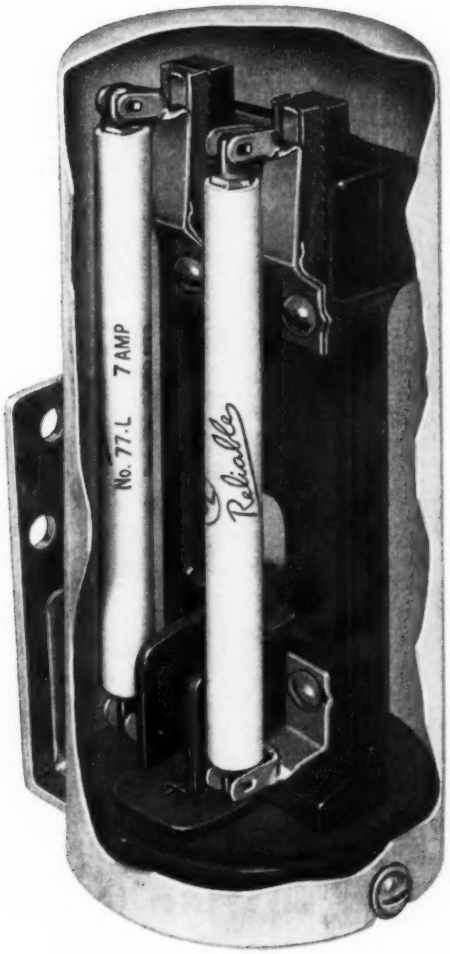

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